Digitized by the Internet Archive
in 2010 with funding from
University of Toronto

http://www.archive.org/details/p2proceedingsmed06roya

PROCEEDINGS

OF THE

ROYAL SOCIETY OF MEDICINE

EDITED BY
JOHN NACHBAR, M.A., M.D.
UNDER THE DIRECTION OF
THE EDITORIAL COMMITTEE

VOLUME THE SIXTH

SESSION 1912-13

PART II

SECTION OF EPIDEMIOLOGY AND STATE MEDICINE
SECTION OF THE HISTORY OF MEDICINE
LARYNGOLOGICAL SECTION
MEDICAL SECTION
NEUROLOGICAL SECTION
OBSTETRICAL AND GYNÆCOLOGICAL SECTION

1805-1834
1907

134970
27/10/14

LONDON
LONGMANS, GREEN & CO., PATERNOSTER ROW
1913

LONDON:
JOHN BALE, SONS AND DANIELSSON, LTD.,
OXFORD HOUSE,
GREAT TITCHFIELD STREET, OXFORD STREET, W.

PROCEEDINGS

OF THE

ROYAL SOCIETY OF MEDICINE

VOLUME THE SIXTH

COMPRISING THE REPORT OF THE PROCEEDINGS FOR THE
SESSION 1912-13

SECTION OF EPIDEMIOLOGY & STATE MEDICINE

LONDON
LONGMANS, GREEN & CO., PATERNOSTER ROW
1913

Section of Epidemiology and State Medicine.

OFFICERS FOR THE SESSION 1912-13.

President—W. H. Hamer, M.D.

Vice-Presidents—

G. B. Longstaff, M.D.
Sir Patrick Manson, G.C.M.G., M.D., F.R.S.
Sir Shirley F. Murphy, F.R.C.S.
A. Newsholme, C.B., M.D.
J. Niven, M.B.
Col. J. Lane Notter, M.D.
H. Franklin Parsons, M.D.
R. D. R. Sweeting, M.D.
Theodore Thomson, C.M.G., M.D
Sir Arthur Whitelegge, K.C.B., M.D.

Hon. Secretaries—

G. S. Buchanan, M.D.
William Butler, M.B.

Hon. Secretary for Navy—Fleet-Surgeon P. W. Bassett-Smith, C.B., R.N.

Hon. Secretaries for Army—

Col. R. H. Firth, R.A.M.C., F.R.C.S.
Lieut.-Col. A. M. Davies, R.A.M.C.

Hon. Secretary for Scotland—A. K. Chalmers, M.D.

Foreign and Colonial Hon. Secretaries—

Sir Arthur Whitelegge, K.C.B., M.D. (France).
R. H. Saltet, M.D. (Holland and Belgium).
Arthur Shadwell, M.D. (Portugal).
Surgeon-General J. Billings, M.D. (United States).
J. Nield Cook (Bengal).
Major F. A. Smith, I.M.S., M.D. (Baluchistan).
Armand Ruffer, C.M.G., M.D. (Egypt and Red Sea).
Professor Kitasato (Japan).
J. S. C. Elkington, M.D. (Queensland).
S. Monckton Copeman, M.D., F.R.S. (Germany).
Frank G. Clemow, M.D. (Russia).
R. Bruce Low, M.D. (South America).
G. Turner, M.B. (Transvaal).
Sir Allan Perry, M.D. (Ceylon).
Theodore Thomson, C.M.G., M.D. (Persia).
J. A. Lowson, M.B. (China).
F. Tidswell, M.B. (New South Wales).
Bolton G. Corney, I.S.O. (Polynesia).

Other Members of Council—

Sidney Coupland, M.D.
R. Dudfield, M.B.
K. W. Goadby.
E. W. Goodall, M.D.
Sir Francis Lovell, C.M.G., F.R.C.S.
Col. W. G. Macpherson, C.M.G., M.B.
J. C. McVail, M.D.
C. J. Martin, M.B., F.R.S.
Sidney Martin, M.D., F.R.S.
Sir George Newman, M.D.
Charles E. Paget.
H. Meredith Richards, M.D.
F. M. Sandwith, M.D.
W. J. R. Simpson, C.M.G., M.D.
C. W. F. Young, M.D.

Representative on Library Committee—E. W. Goodall, M.D.

Representative on Editorial Committee—G. S. Buchanan, M.D.

SECTION OF EPIDEMIOLOGY AND STATE MEDICINE.

CONTENTS.

October 25, 1912.

PAGE
Presidential Address: The Influence of Migration upon the Phthisis Death-rate. By W. H. Hamer, M.D. 1

November 22, 1912.

The Influence of Parental and Grandparental Age at Birth of Offspring on their Susceptibility to the Zymotic Diseases. By R. J. Ewart, M.D. ... 49
Some Recent Theories of Tuberculosis and their possible Significance. By F. G. Crookshank, M.D. 68

January 24, 1913.

The Behaviour of Diphtheria in Schools. By J. A. H. Brincker, M.B. ... 85

February 28, 1913.

The Title and Objects of the Section 119
Measles. By William Butler, M.B. 120
A Note on an Epidemic of Measles at Rotumá, 1911. By B. Glanvill Corney, I.S.O. 138

April 4, 1913.

The House as a Contributory Factor in the Death-rate. By A. K. Chalmers, M.D. 155

April 25, 1913.

PAGE

A Note on Sleeping Sickness in Principe Island and Angola, West Coast of Africa. By Surgeon McCowen, R.N., M.D. 191

The Diphtheria Bacillus and Scarlatinal Infection. By T. Shadick Higgins, M.D. 195

May 23, 1913.

Anthrax in the Woollen Industry, with Special Reference to Bradford. By F. W. Eurich, M.D. 219

The Council think it right to state that the Society does not hold itself in any way responsible for the statements made or the views put forward in the various papers.

John Bale, Sons & Danielsson, Ltd., 83-91, Great Titchfield Street, London, W.

Epidemiological Section.

October 25, 1912.

Dr. W. H. Hamer, President of the Section, in the Chair.

PRESIDENTIAL ADDRESS.

The Influence of Migration upon the Phthisis Death-rate.

The wide influence which has been exercised by the epidemiological investigations of Dr. Bulstrode, and the devoted services rendered by him, during more than twenty years, as an officer of the Epidemiological Society, marked him out as the member of the Section who would follow Dr. Theodore Thomson as the occupant of this chair. Dr. Bulstrode's deeply lamented death has made such succession impossible, and Dr. Theodore Thomson and the Section have called upon me to act in his place. I have felt bound to acquiesce, for I realize that during the years in which I was privileged to assist Dr. Bulstrode, in his endeavours to promote the Society's interests, I enjoyed special opportunities of learning the working of his mind, in so far as his beloved epidemiology was concerned. The subject for present consideration must then necessarily be his subject, that of his Milroy Lectures, and of his Sanatorium Report.

No epidemiological phenomenon of the last fifty years is more striking—none is perhaps so little understood—as the decline in the death-rate from phthisis. Many times has it been discussed before the Epidemiological Society, and you are all familiar with the papers which have been read. Professor Pearson, at York, the other day, alluding to a certain class of literature ("If," he said, "I may venture to call it such"), stated that "medical officers of health certainly read their own reports," but he doubted "how far they had leisure to study those of their colleagues." Medical officers of health, on learning that they may venture to regard their reports as literature, will doubtless experience some such gratification as was felt by M. Jourdain, when he was made to realize by the Maitre de Philosophie, that for forty years and more he had been talking prose without knowing it. Turning, however, to Professor Pearson's main contention, if it be based upon "iatro-mathematical" methods it may be deemed presumptuous to criticize it; but its "probable error" must be very large. At any rate, our withers are unwrung, for we have all been deeply interested in this problem of phthisis, as discussed by epidemiologists from the time of Buchanan, in the sixties, down to the work of Longstaff, Payne, Bulstrode, Newsholme, Niven, Ransome, Squire, Beevor, Bulloch and Greenwood, and Shirley Murphy in recent times. We have even tried to decipher the meaning lying hidden behind the hieroglyphics constituting the chief means of expression in the literature (if we may venture to call it such) of the biometricians.

And here it should be noted at the outset, that if the inscription which confronts us be not "All hope abandon ye who enter in," it must be almost as little encouraging. Farr, Ogle, Tatham, have all warned us. Bulstrode wrote: "All these statistics must be accepted with the greatest circumspection and reserve"; and, he added, "the difficulties are due mainly to altered nomenclature, better diagnostic methods, greater facilities for obtaining medical assistance in hitherto inaccessible districts, and the application of bacteriology to medicine." But then he says, quoting Dr. Straus, "La statisque malgré ses imperfections demeure encore le meilleur élément d'enquête." Bulstrode none the less felt that the difficulties from this side were far greater than was generally believed, and the question more than once arose in his mind, "Has phthisis really declined at all?"

In attacking the problem from the alteration of nomenclature point of view, it needs to be recognized that no single disease heading will fill the gaps left at the various age-periods. Ogle tried his hand at interchange between phthisis and diseases of the respiratory system. Newsholme has shown that transference to pneumonia and bronchitis is not in itself sufficient to explain decline in phthisis. The last word has probably not been said on the nomenclature question, but, however it be examined, after accounting for this perturbation and that, due to this and that possible transference, there has always remained a sense of some influence as yet undetected. That varying nomenclature itself has played havoc with the figures cannot be questioned, having regard to the differing connotations of the "decline" of the fifties and the "pulmonary tuberculosis" of the present day. Fothergill held that the mortality from consumption was "estimated too high, in the parochial returns, all those who die of any lingering disease being generally registered as consumptive"; and Thomas Young said, "the name 'consumption' was never intended by the ancients to denote a wasting of the lungs themselves, which it was impossible for them to ascertain, but a wasting of the body, depending on a disease of the lungs." There must, further, be remembered the great extension of the use of the term "cancer," and the wide employment, nowadays, in the case of diseases accompanied by wasting or decline, of special designations—diabetes, anæmia, leucocythæmia, lymphadenoma—and the increased assignment of deaths to various forms of heart disease, and to diseases of the nervous, urinary, and gastro-intestinal systems, and the rest. A further point which suggests that fashion and other special circumstances in particular countries still play a part, is the differing age-incidence of phthisis deaths in, for example, Germany, England, and Ireland.

The astronomer having made his calculations, decides that there must be some dark body which perturbs the star whose motion he is investigating; so is it with phthisis death-rates, some unrecognized influence is manifestly at work. The generally accepted explanations—better feeding, improved housing, and the rest—assuredly do not account for all the facts. After making appropriate allowance for them all, and after taking into account the nomenclature difficulties, there is still an unexplained decline. To what is it due? I venture again to draw your attention to an aspect of the question touched upon by various writers, but which is deserving of much more careful study than has hitherto been devoted to it. I refer to the question of migration.

We, of course, have all, at one time or another, glanced at this question, but the problem is a difficult one. If once it be accepted as meriting serious attention, it becomes surprising to note how cursorily it has been dealt with, even by classical writers on the "Declension of Phthisis." Sir Hugh Beevor, it is true, starts by stating that its influence is not unimportant. He asks, "Do people return home or seek the country to die?" Taking first West Ham, he finds, contrary apparently to expectation, that patients from this district die in London hospitals. Taking, again, Freebridge, Lynn, and Hingham in Norfolk, he has to record 10 per cent. of imported cases. This, from our point of view, is a percentage worthy of consideration; but he infers that "rural incidence cannot be said to be masked by immigration." Then he turns to age-incidence, and argues that both at 10 to 20, when emigrants from the towns are few, and at 20 to 35, when they are more numerous, the big towns have lower rates than the rural districts; hence, he concludes, "the Registrar-General's returns truly tell the county phthisis-rates." I hope to be able, in the sequel, to adduce considerations which will show that there is more than this in the age-incidence question. Dr. Newsholme, in the *Assurance Magazine*, vol. xxxiv, criticized Sir Hugh Beevor, and in particular his comparison of urban and rural rates. The criticisms are interesting, but are necessarily only *obiter dicta*. In "The Prevention of Tuberculosis," however, the importance of the migration difficulty is clearly recognized. Dr. Newsholme says (p. 206): "Any set of figures, intended to measure disease-incidence, must, in particular, be free from the fallacies due to migration of patients, whereby an infection may be acquired in one district and be chronicled as disease and death in the statistics of another. For this reason, among others, local statistics have to be handled with caution, even when they concern acute infectious diseases of only a few weeks' duration. Tuberculosis is not only an infectious, but also a chronic, disease, which, on the average, probably extends over years, and often escapes recognition during a large part of the time. Fallacy is almost inevitable in such a case, if inferences as to causation are sought from individual groups of local statistics." . . . "The figures of a small rural county, with a population less than that of many single towns, could only be used for inference as to the causes of variations in its tuberculosis death-rates, if correction were made for the migration of healthy persons to towns, and of sick persons to their country homes, where they can live at a smaller cost and nearer their own people." Dr. Newsholme, therefore, seeks to avoid the migration difficulty by rejecting all "parochial" statistics; thus, he says, "To eliminate or minimize the effects of migration and complexity, we must study communities in which the balance between immigrant and emigrant is small relatively to the total volume of disease, and which are so large as to allow the operation of complex phenomena to become evident." Upon this the criticism may be made that accurate knowledge, collected in a limited field, may have more value than inferences based upon a large mass of imperfect records, and Dr. Newsholme, presumably, has this possibility in mind, for he adds, in qualification of the statement already quoted, "The experience of smaller communities can only be taken either as hints, which may possibly be confirmed by other information, or as illustrations of the manner of action of influences, of which the existence has been demonstrated independently." Hints and illustrations sometimes carry us far. Thus it may transpire that imperfections, discoverable on study of familiar parochial figures, may run all through national statistics; and in that case it is important to note that it does not necessarily follow that all difficulties will be overcome by widening the scope of inquiry. It is true we are constantly being urged, as recently by Professor Pearson at York, "to give value to weight of numbers"; or, again, to apply our formulæ, if necessary, even to loose data, with confidence that "modern mathematical methods reach a perfectly definite result when applied to such data." But we need also to remember that a little leaven leaveneth the whole lump, and it may be found that the experience of a rural county will furnish "hints confirmed by other information," and "illustrations of the manner of action of influences," which affect the death-rates of kingdoms and continents. Dr. Newsholme, in his book has, further, a striking chapter (xxix) in which he discusses Virulence, Natural Selection and Decadence, and in which, more or less incidentally and in connexion with Ireland, migration again comes under consideration; but to this chapter it will be necessary to return later.

When two accomplished epidemiologists have surveyed the ground and have set up the warning "No road here," it seems temerity to attempt to advance. But there is authority in a contrary sense also. Indeed, no less a person than Thomas Young was apparently convinced that it was imperatively necessary to deal with the influence of migration.[1] Furthermore, there is the consideration that Nature, as Hecker has reminded us, "permits not any phenomenon to originate from isolated causes"; the effect is the resultant of a multiplicity of causes, each of which must be reckoned with. The rise and fall of the phthisis death-rate are determined by many influences, and it is necessary to study every possible influence, and some require much looking for. The observer watching a "tug of war" between two competing teams might greatly err if he correlated the tractional force exerted by any single member of either team with movement to one side or the other. For some seconds the rope may remain stationary, and yet an individual member of a team may, for part of this time, pull hard, while for the remaining part he may have been practically *hors de combat*. Another member may silently exercise throughout steady traction, which materially influences the result, and yet his efforts may fail altogether to excite notice. So in this matter of decline of phthisis,

[1] *See* "Consumptive Diseases," 1815, pp. 95-97.

it is quite easy to overlook an important determining influence, and perhaps partly on this account to attach undue importance to some obtrusive factor which shows for a time close correlation with phthisis movement. It is becoming generally realized that it is necessary to look very critically into questions of correlation; there are, indeed, nowadays, those who argue that the more complete the correlation the less likely is it to imply causation, and the more likely to connote coincidental effects of some common cause. The trained statistician is, on his part, beginning to urge application of the method of "treatment by partial correlation"; but with regard to this it is perhaps pardonable to adopt the opinion pronounced concerning the terrible language of the Basques: "There are those who say that the Basques understand one another, but for my part I refuse to believe it."

Something can, however, be accomplished by "long-continued labour in the minute sifting of numerical results," even by the aid of ordinary arithmetic, and I desire, in the first place, to fix your attention upon a familiar example of such careful sifting worked out by Sir George Buchanan fifty years ago. Here, indeed, is material of the utmost importance in relation to migration, and, if I am to carry you with me at all, I must first interest you once again in this masterly and fascinating inquiry.

In the "Report upon Phthisis in Kent, Surrey and Sussex"[1] we have, in fact, forced on our attention need for consideration of a powerful influence, working unobtrusively and yet declaring itself in unmistakable fashion when once we look for it. It will be remembered that Sir George Buchanan arranged the fifty-eight registration districts of Kent, Surrey and Sussex according to the order of their death-rates from consumption. In determining this order persons between the ages of 15 and 55 were alone considered, the mean of the death-rates of the two sexes being that which primarily determined the position of the districts in the table; but where the male rate was obviously subjected to disturbing influence, from which the female rate was comparatively free, the position of a district was determined by the latter rate. Furthermore, certain difficulties which surrounded this statistical inquiry were "laboriously attacked," but not in every instance "satisfactorily overcome." Again, it seems to be generally agreed that the main conclusion arrived at, that "wetness of soil is a cause of phthisis to the population living upon it," merits further study and examination, in the light of knowledge now available after the lapse of nearly half a century. I desire to direct your special attention, then, to three points. First, to the ages considered in arranging the districts in the order of their death-rates; secondly, to some of the difficulties "laboriously attacked"; and, thirdly, to the statistics of the fifty-eight districts in the later decades.

---

[1] Tenth Report of the Medical Officer of the Privy Council (1867), 1868, pp. 57-110.

Phthisis death rates (males, females, and all persons) for the decennial period 1851 – 60, compared with the corrected mean phthisis death rate for the same period.

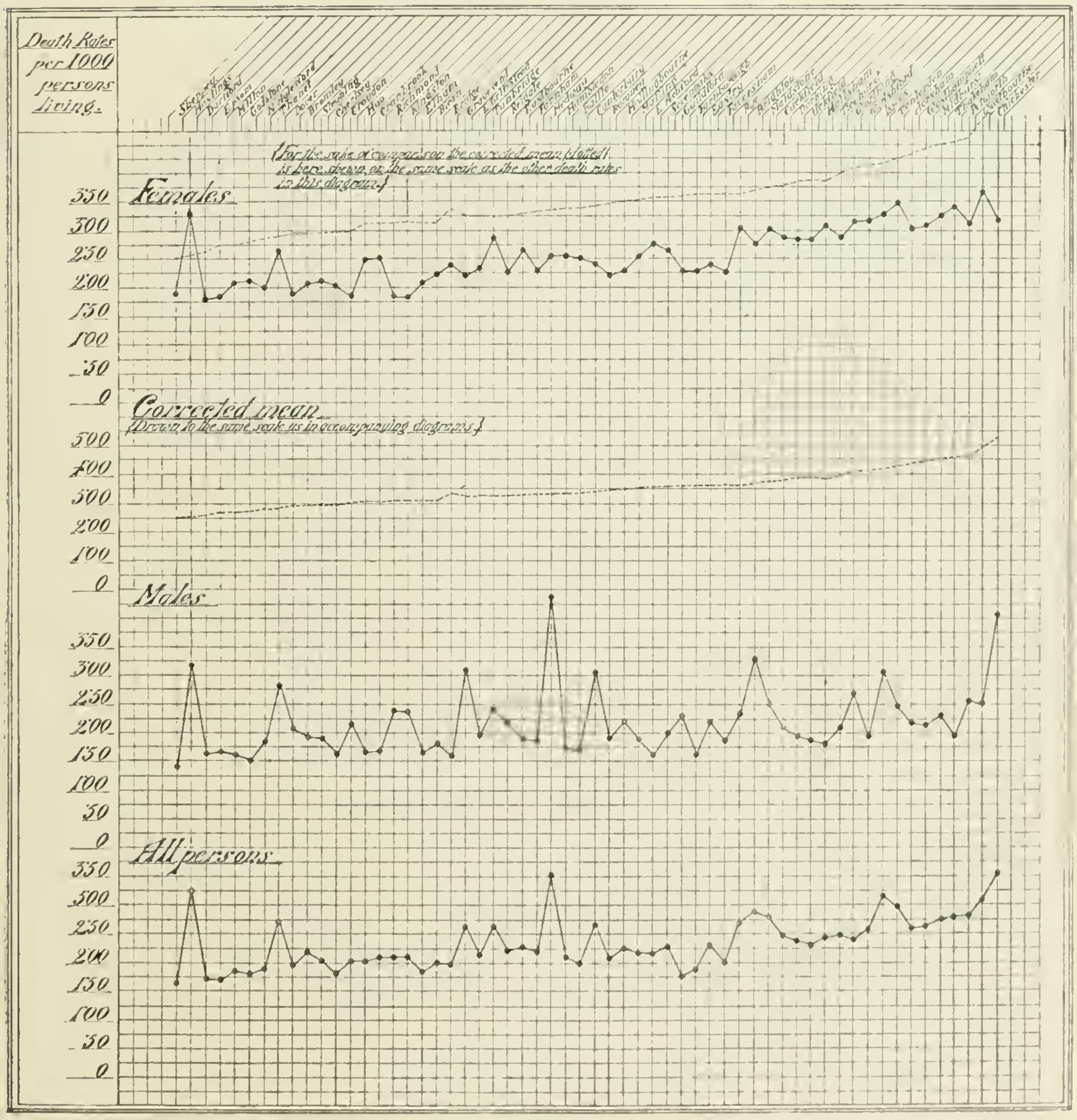


DIAGRAM I.

Taking first the age question, I hope to be able to convince you that demonstration of wide variations in the death-rates of the registration areas was in part facilitated by the fact that attention was confined to the ages 15 to 55, and that special stress was laid, in cases of difficulty, upon the female death-rate. In almost all the hardly hit districts the female death-rate was disproportionately high, and the age-distribution of the population, and particularly of the female population, was quite abnormal. Sir George Buchanan observes, in speaking of Hailsham, "There is no known reason why the female rate should be in such very great excess of the male, but the same fact will be observed in most of the districts which have high rates."

If the rates for persons, males, and females, at all ages, in the fifty-eight districts, and the corrected mean rates at 15 to 55 (both sexes) for those districts, be plotted out in juxtaposition to one another and examined (diagram I), it will be seen that the curves showing the rates for persons and for males present marked irregularity; that showing the rates for females has a more marked tendency to rise on proceeding from the lowest to the highest districts of the series; the corrected mean rates (both sexes) for the ages 15 to 55 show, however, in comparison with the female rate at all ages, a more steady increase and a considerably wider range on proceeding from the most to the least favoured districts. This last-mentioned point will be made clear if the slope of the broken line in the middle of the diagram be compared with that of the broken line at the top of the diagram. The former line (which is drawn to half scale) has a slope comparable to that of the female death-rates; the latter (drawn to full scale) has a steeper slope. In relying upon the rates at the special phthisis ages Sir George Buchanan was, of course, in design, correcting for age-distribution of the populations concerned, but, by making this correction, he, as a matter of fact, actually brought into greater prominence the differences in the series of districts examined, and thus made more uniform, and at the same time steepened, the slope of the curve relating to those districts. The reason for this becomes clear when it is realized that in many of the hardly hit districts there was notable deficiency in the number of persons at the phthisis ages, and that the deficiency is particularly exhibited in the case of females, and especially of women aged from 15 to 25. The fifty-eight districts include, in point of fact, a number of rural districts (diagram II) showing deficiency of females aged 15 to 25; they also comprise certain towns—Hastings, Lewes, Brighton, Steyning (including Worthing and Hove), and Chichester, which show a marked excess of females at these ages (diagram III).

Clearly we have, here, to deal with the influence exerted by migration from rural districts to the towns. Sir Hubert Llewellyn Smith, in his chapter on "Influx of Population," in vol. iii of Mr. Charles Booth's "Labour and Life of the People," carefully discussed this subject, and his authority can, therefore, be appealed to as regards the actual facts. He describes a village, in the centre of a purely agricultural district in the Eastern Counties, in the eighties. The picture to be drawn of

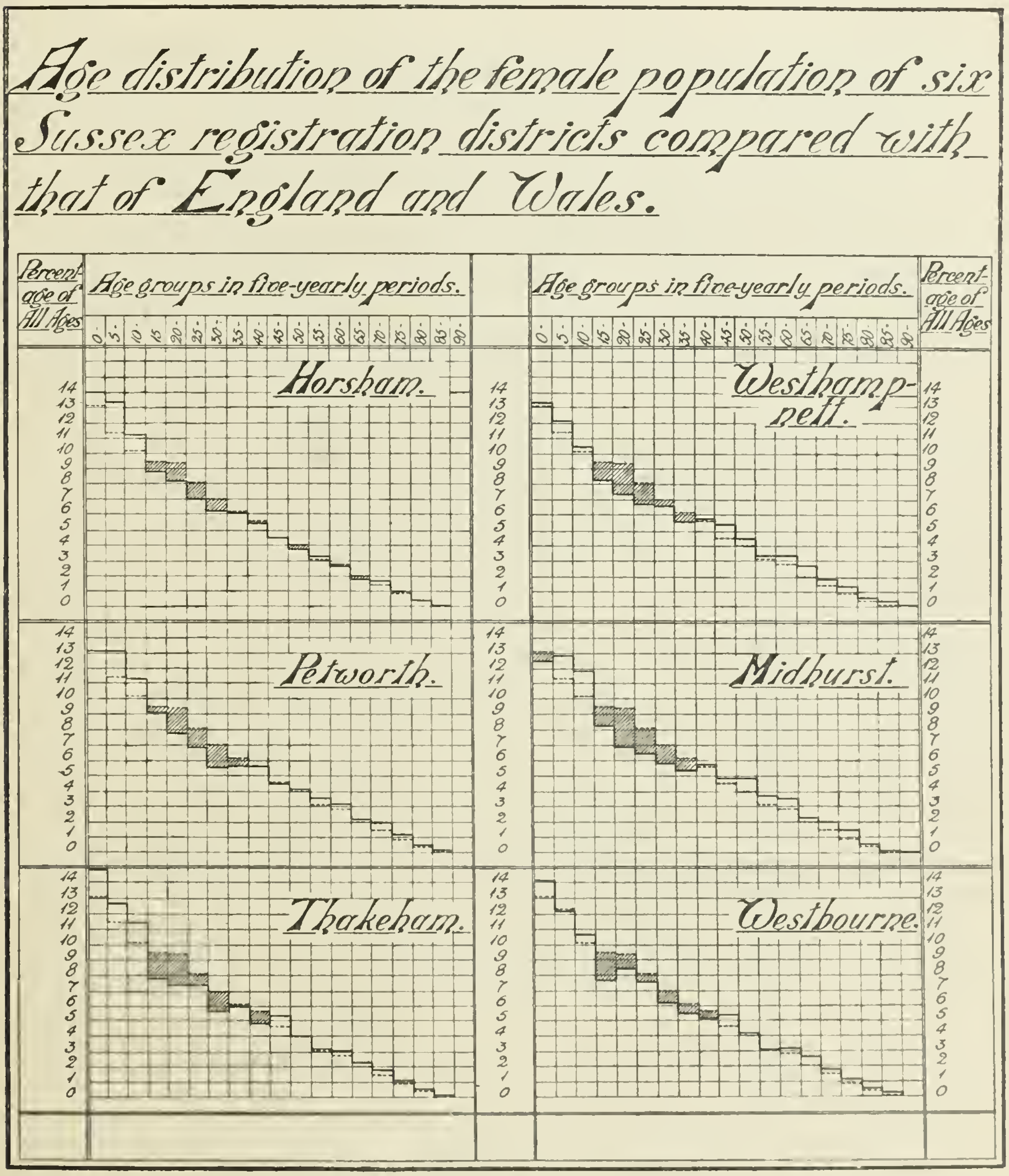


Diagram II.

Sir George Buchanan's Sussex villages might almost be a replica of this, though the difference in date (the eighties as compared with the sixties) should not be lost sight of. Sir Hubert wrote, speaking generally of

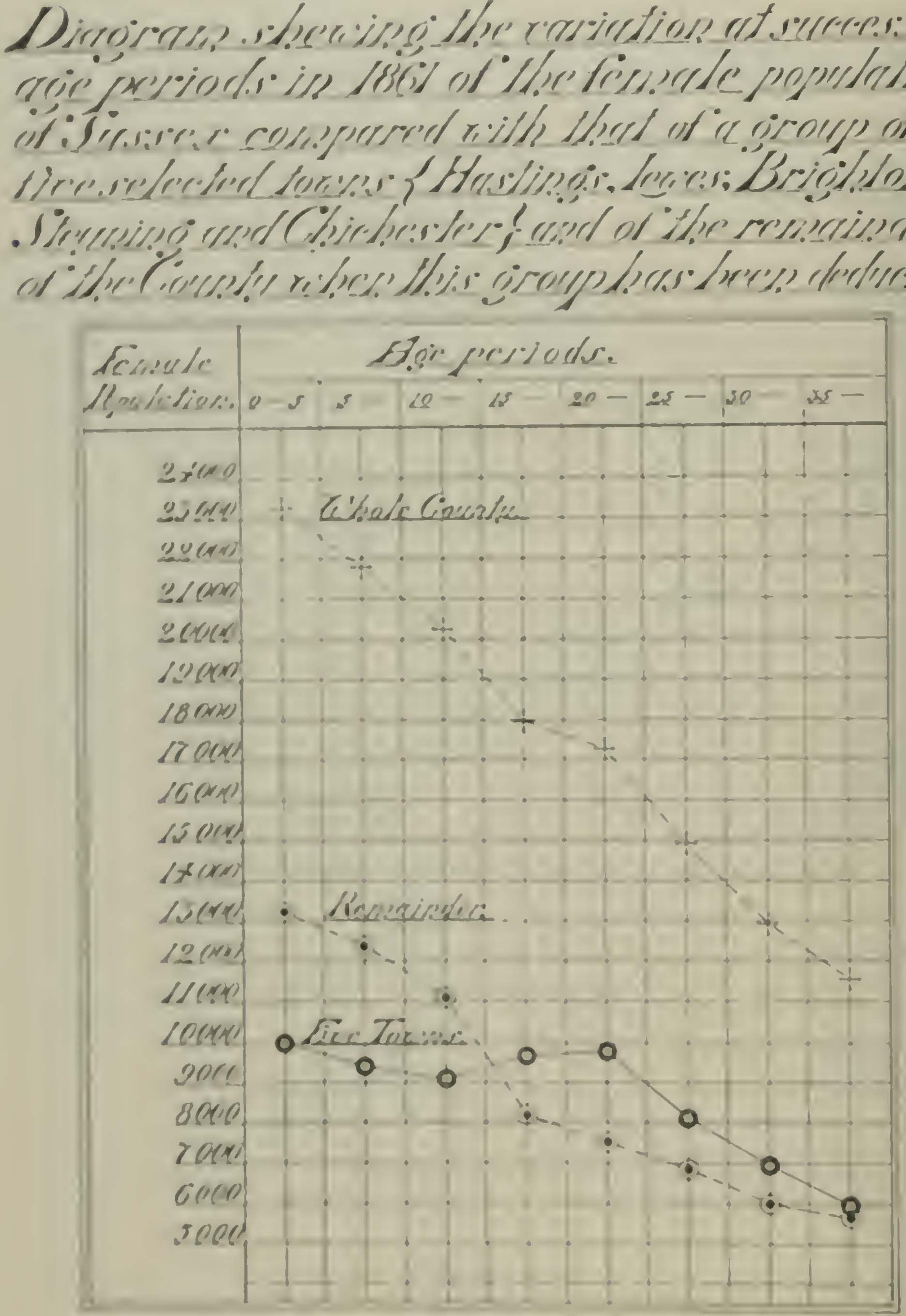


Diagram III.

the area he was dealing with: "The proportion of young men from 20 to 25 in the district is a third too few, and of men over 60 twice too great, as compared with the whole country." . . . "In the school all the brightest boys are living in the expectation of going up to town.

Most of them have relations there already. At home, there is no opening, and it is deadly dull. Hard by dwells a labourer with a family of twelve. Six are in London already, and the rest will follow when old enough. Across the road there used to live a family of nine. All the sons and daughters are now gone; six to London, one to a neighbouring village. It is the same in all the villages round." Then follows an account of the career of a migrant ("one Potton, from Little Guilden") in which occur the statements, "a country nucleus, once established in any particular district in London, grows in geometric ratio by the importation of friends or relatives"; again, "the loss of rural industries has thrown the labourer on the land for support and closed the door to women's employment"; . . . . once again, "more potent, perhaps, than any of these causes, has been the change wrought by the school, the railway, and the penny post."

Then on the question of age, he says, 80 per cent. of the migrants are between 15 and 25 years old; and, further, as regards sex, he speaks of "the great difficulty of obtaining satisfactory statistics on the question of female migration. We know that, as a whole, it is greater in volume than that of men—that is to say, on any given day more women than men are living outside the district of their birth. Of course this is largely due to the demand for domestic servants, who, as noted above, become in turn centres for promoting fresh migration. But there is also a large non-economic element, arising out of the fact that a woman, on marrying, is more likely to live in the district where her husband previously resided than vice versa. This fact is enough to make the interpretation of the statistics of female migration very difficult." The final sentence must be quoted: "Perhaps we may say that there is a set of productive labour towards centres of high wage and high cost of living, and of unproductive consumers towards districts of low wage and low price."

All these conclusions drawn from study of the Eastern Counties and of East London may be held to be paralleled in the facts presented by the villages of West Sussex, twenty years earlier.[1] The question has been illustrated at length because it is clear that if persons at the

---

[1] The contrast between a growing industrial community like that of Lancashire and the Sussex population can be seen at a glance on consideration of the following figures:—

Lancashire	Increase in population, 1851-61	398,065
	Excess of births over deaths	254,178
Sussex ...	Increase in population, 1851-61	27,232
	Excess of births over deaths	40,853

phthisis ages are being removed from the villages, the phthisis-rates at those ages must be materially affected. Careful examination of the districts studied by Sir George Buchanan shows that those with the highest rates are, as he stated, districts in which the female rate is in great excess of the male; and further, in them there was consistently manifested a deficiency of females, and less conspicuously of males, at the phthisis ages. We have to consider, therefore, whether migration of persons at these ages from the hardly hit districts was specially favoured during the decade to which Sir George Buchanan's figures relate. In these districts the population at the phthisis ages is conspicuously below normal, and the death-rates at those ages are conspicuously higher than normal. Are we not justified in assuming that young adults were, at the time of the inquiry, leaving the villages, but returning to them in some instances when ill and unable to work? Confirmation of such an assumption is afforded by the consideration that the death-rates at the phthisis ages, in these hardly hit districts, are much higher in women than in men; for it is well known that women more especially tend to return to their homes when they are ill.

If such a combination of circumstances as that above outlined actually operated in certain villages, it will be apparent that Sir George Buchanan, in making correction for age-distribution, was really throwing into bolder relief than ever the disturbing influences operating upon the various age-groups. If, in point of fact, the girls and young women of the Sussex villages mainly represented among the hardly hit districts were, during the sixties, migrating in unusual numbers into London, Brighton, and other towns, and if some of them, on becoming phthisical, returned to the Sussex villages, and died there, there would be sufficient explanation of the abnormal age-incidence and the abnormal female phthisis death-rates. Furthermore, in calculating death-rates upon the ages 15 to 55, an excessive number of deaths would be applied to a population erring on the side of defect, and it would, therefore, come about that, in making correction for age-distribution, Sir George Buchanan was really steepening his curve, and tending more than ever to thrust the districts, in which migration was especially marked, towards that end of his series in which the higher rates were observed.

This, then, is the point to which we are brought by examination of the question of the ages dealt with. It will be well, now, to turn in the second place to some of the difficulties "laboriously attacked, but not in every instance satisfactorily overcome." Among these were included the influence of institutions in increasing recorded mortality from consumption, and the use of certain places as resorts for consumptive invalids. Very striking are the comments, for example, on *Gravesend*, which "is not a little used by the poor of the East End of London, who, when they get consumptive, find this town cheap, and to their notions like the seaside." Again, at *Eastbourne*, "deduction must be made for visitor invalids." At *Farnborough* reference is made to the "special occupation of 3,029 of the male population, any of whom, when they are ill, are sent out of the district to hospital." At Walmer, in *Eastry*, the possible disturbing influence of the marine hospital and barracks is noted. In *Sheerness*, "The census papers give evidence of considerable importation of males, from 15 to 45 years old, and of some exportation of them, after the latter age; a large proportion of the incomers being unmarried. The presumption is that these people are of the healthier, and that if they were unable to work they would go away from the district to be nursed. Local information confirms the conclusion that the phthisis-rate of males is thus artificially lowered." Speaking again of *Sheppey*, Sir George Buchanan says, "It is pretty clear that many females also spend the middle period of their lives here, probably coming and going with their husbands, or in case of illness returning to their previous residence. . . . they are treated when sick in the hospital attached to these barracks; but, if they get phthisis, are often discharged invalided, and die in other districts." In *Hastings*, "Certainly more than half the registered mortality from this disease (phthisis) is among visitors." In *Thanet* the phthisis-rates are raised "to a great and unascertainable extent by the practice of sending consumptive invalids to Margate in the late stages of their complaint." In *Tonbridge* "not less than half the consumptive deaths of that town (Tunbridge Wells) have been among visitor invalids." In *Medway*, "the male death-rate is greatly affected by the presence of a number of military and naval establishments in the district."

Perhaps the most significant comment is that made in respect of *Brighton*. An "important disturbing influence (whose amount cannot at all be ascertained) is the use of Brighton as a place of residence for consumptive invalids; or the converse disuse of the town by residents who there become consumptive." This last suggestion is a particularly illuminating one. We have seen how the Sussex villages near Brighton are depleted of their young women, and how Brighton itself shows a notable excess of females at from 15 to 35 or 40 years of age. The tendency noted on the part of the female residents of Brighton at the phthisis ages to disuse the town *when they became consumptive* is very important, as there can be no doubt that many of these women came from the neighbouring Sussex villages, and that it was to these villages they ultimately returned.

There is, here, then, evidence of drift of a very striking character. Dr. Newsholme, in his book (p. 207), has commented on the fallacy of drawing inferences as to the effect on phthisis of "overcrowding," without carefully weighing the extent to which the inhabitants of the overcrowded tenements "drifted into them after, and, perhaps, because they had become consumptive." Again, he says, allowance should be made in comparing different districts "for the influx of consumptives into poorer districts as they go down in the social scale." Similar evidence may be extracted from Cornet's figures relating to inmates of Catholic nursing institutions in Prussia. The death-rates there recorded were, at any rate, in considerable degree, augmented by reason of the fact that those trained in the institutions, and afterwards going out into the world, gravitated back to the institutions when they became phthisical; while apparently more potent still was the attractive influence exerted upon women already the subjects of phthisis, an influence clearly demonstrated by the very large percentage of recorded deaths occurring among those who had quite recently entered the institutions. In the same connexion the parallel instance of the common lodging-house may be referred to. Sir Shirley Murphy has pointed out that the histories of the phthisical inmates of common lodging-houses in London show that symptoms of phthisis were already present in nearly half the cases investigated, prior to the persons in question having ever entered a common lodging-house.

A third point now remains to be referred to, the question of soil dampness and its relation to phthisis mortality in the fifty-eight districts in successive decades. Sir George Buchanan's main thesis is illustrated by him so fully as to leave practically nothing to be said. Too great stress must not, however, be laid upon soil dampness, for, as he pointed out, the district "which has by far the lowest registered phthisis death-rate of any in the south-eastern counties is an island of London clay"; while, again, the districts most hardly hit were almost without exception grouped in the south-western portion of Sussex, where the chalk is well represented. A new source of difficulty, however, with regard to the dampness of soil hypothesis is encountered by reason of the fact that the order observed in the sixties has not been followed in succeeding decades; some such similar arrangement is, indeed, traceable in the seventies, and dimly discernible in the eighties, but it is practically non-existent in the nineties, and in recent years has been entirely lost (*see* diagram IV).

Phthisis death rates for all persons in 58 sanitary areas in Kent, Sussex, and Surrey, for the decennial periods from 1851 to 1900 compared with the corrected mean phthisis death rate for 1851–1860.

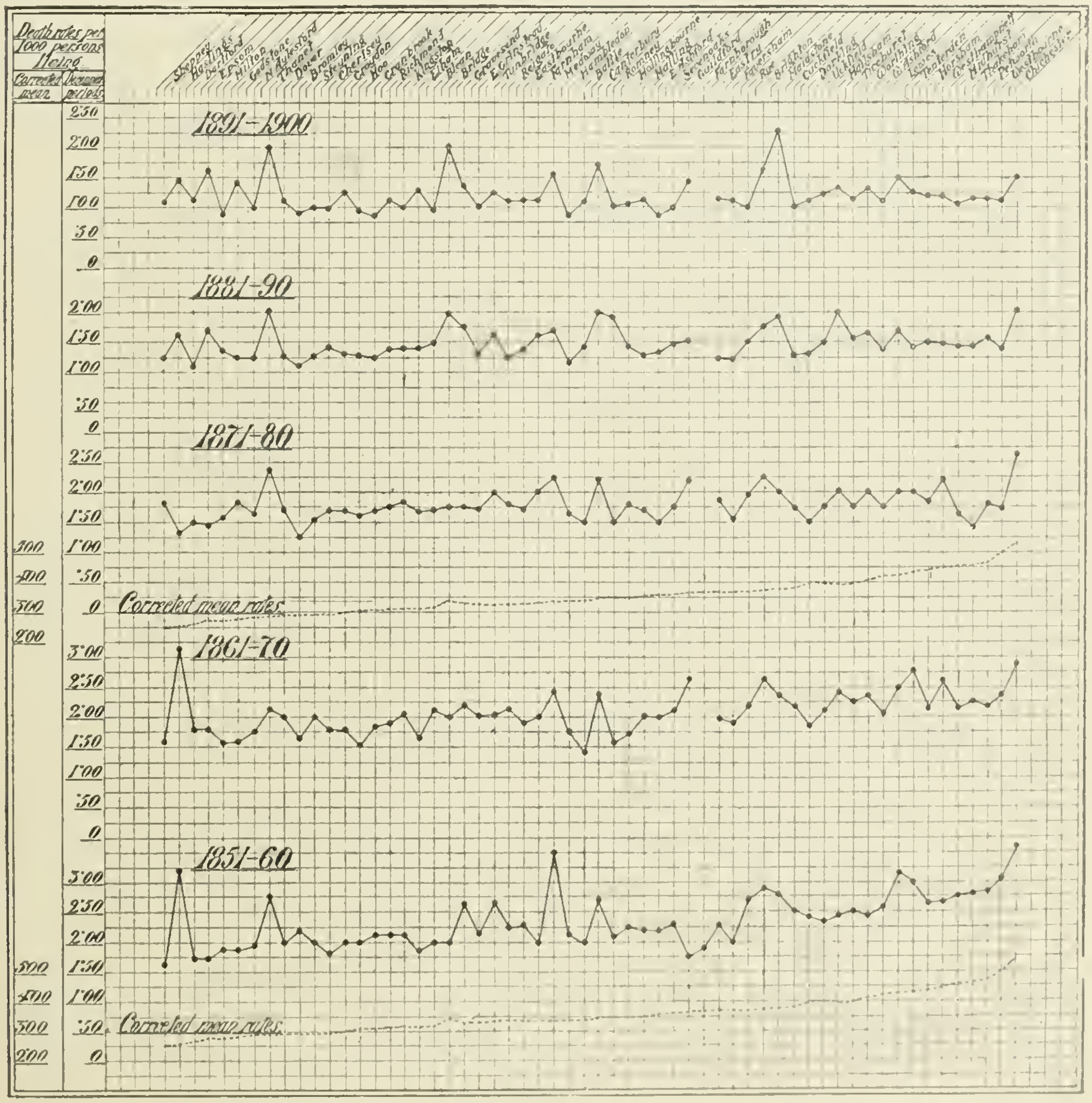


DIAGRAM IV.

Dr. Charles Kelly, Medical Officer of Health of West Sussex, in commenting (1879) upon the improved death-rates from phthisis in six Sussex rural districts, said: "In these rural districts there has been no change whatever in the drainage, and so far as the removal of subsoil water is concerned, the houses are in much the same state as they were twenty years ago; the great difference in the amount of consumption is probably dependent upon many causes—the improved state of the cottages, the rise of wages, leading to the children being better clothed and fed, the increase in railway communication which tends to diminish intermarriage and to cause more change of population—all these changes, social as well as sanitary, have had their share in the improvement." Dr. Kelly noted, moreover, "that most of the impervious beds are to the north of the South Downs, and consumption seems most common in places which are bleak and exposed as well as damp." Again, he says, "In Dr. Buchanan's report, amongst the West Sussex districts, Steyning was the highest and Petworth the lowest on the list; had the comparison been made in the next decade, 1861-70, the position of nearly all the unions would have been materially altered." He continues, "The consumption or phthisis death-rate has been distinctly lowered in recent years, but the above facts do not seem to show that dampness of soil has a very intimate connexion with the disease, because such great variations occur in the prevalence of the disorder, while very little, if any, change has taken place during the same period in the drainage of the soil." Dr. Kelly, in a later report (1887), returned to the subject, and concluded that "the mortality from phthisis and all causes is very nearly the same on each variety of soil"; and, again, that "the order of the districts as regards mortality is quite altered."

An interesting paper on "The Effects of Intramigration on National Health" has recently been published[1] by Dr. J. Stewart Mackintosh, in which it is pointed out that before the days of cheap and rapid travel the rural population "consisted largely of small and practically isolated communities, closely inbred and closely specialized for local climatic and social conditions." Dr. Mackintosh holds that when members of these communities migrate there is great danger of degeneration," if the new environment differs materially from the old." He draws his illustrations from the effect of removing two distinctive Sussex types of domestic servant to North-west London. The one comes from the Weald, the other from "the coastal strip which comprises the well-known chalky South Downs." Dr. Mackintosh urges that "Until the county of Sussex" was "opened up by improved roads, and the advent of the railway encouraged the development of the great coast towns, the population had been undisturbed through long centuries." Experience shows, he says, that North-west London suits the Weald type, but does not suit the coastal type; in the one case there is migration from the Weald clay to the London clay; the individual of the other type "coming from a highly permeable soil, finds herself in an environment differing materially from that in which her stock has undergone evolution during a number of centuries, particularly in respect of humidity of soil and confinement to the house." Dr. Mackintosh does not refer to Sir George Buchanan's report, but it would be interesting to know more of the distribution of his two types in relation to the fifty-eight Sussex registration districts.

---

[1] *Brit. Med. Journ.*, 1912, ii, pp. 467-71.

In view of the three sets of circumstances which have now been considered—viz., first, the remarkable relation in which the observed order of the fifty-eight districts in the sixties stands to peculiarities of age-distribution; second, the notable influence of migration during that decade; and third, the failure on the part of the fifty-eight districts to exhibit the same order as regards phthisis mortality in the later decades, it is necessary to make further study of the special circumstances of the original decade.

In diagram V the ratio per cent. of persons 20 years and upwards, engaged in agriculture (1851), has been plotted out for the fifty-eight districts, and the curve is shown (at the lowest part of the diagram) in relation to the dotted line indicating phthisis prevalence. The urban areas, Thanet, Richmond, Croydon, Gravesend, Medway, Canterbury, Brighton, and Chichester, show, as might be expected, wide range of variation, but, generally speaking, the rural districts with a high percentage of persons over 20 years of age engaged in agriculture are districts with high mortality from phthisis.

The next curve on the diagram shows increase or decrease in agricultural labourers in 1861 (as compared with 1851); decrease being shown by excursions upwards, and increase by excursions downwards. Richmond, Gravesend, Medway and Canterbury, as before, are quite exceptional (the figures being small and untrustworthy in these instances). The curve as a whole shows some correspondence with the rise of the dotted line, though this is less marked than in the lowest curve.

On coming to the question of diminution in the numbers of young females aged 10 to 25, the general trend of the curve is quite similar to that of the dotted line. Steyning (which contains Hove and Worthing), Kingston, Reigate and Eastbourne, Farnborough, and of course Brighton, show wide variations, but on the whole there is most unmistakable correspondence between the extent to which the fifty-eight districts suffer from phthisis, and that to which, in 1861 as compared with 1851, they displayed a diminution of females aged 10 to 25 years of age. The uppermost curve shows the female phthisis deaths (ages 15 to 20) per 1,000 of population, in comparison again with the dotted line, and the correspondence here, of course, is fairly close.

Having in view, then, the extent to which agricultural depression is known to have operated in the sixties: the great attraction exerted upon the young adult population of the agricultural villages by London and the rapidly growing provincial towns, during that decade; and the close correspondence exhibited by the curves showing phthisis prevalence with the curve indicating migration from the fifty-eight districts, and in less degree with those measuring agricultural depression, there can be no doubt that the order of phthisis prevalence in the fifty-eight districts was largely determined by movement of population.

This consideration, taken in conjunction with the striking instances of the influence of migration cited in connexion with particular districts by Sir George Buchanan, raises, however, a larger question. We realize that in the case of a disease like phthisis, movement of population has a vastly larger effect upon death-rates than is manifested with diseases of comparatively short incubation period, and we have now to inquire whether conditions which so profoundly affected the statistics of a few Sussex villages in the sixties may not have exercised an influence, the extent of which may not yet have been sufficiently realized, upon phthisis statistics in the world at large.

An objection may be urged, however, to the effect that migration has been continuously in operation, while the excessive incidence of phthisis upon the hardly hit districts was especially marked in the sixties. The reply to this is that in these inquiries we are always dealing with an interplay of forces, at one time one factor assumes prominence, at another time another. The relation of dry years to scarlet fever prevalence was detected by Dr. Longstaff, as the result of study of scarlet fever mortality, year by year, in the sixties and seventies, but no one doubts that dry seasons exert, year in and year out, their influence on scarlet fever. The circumstances of the sixties and seventies specially favoured Dr. Longstaff. In a similar way, the great development of means of intercommunication in the sixties, together with the agricultural depression and the suctional action exerted by

Corrected mean phthisis death rates, 1851-60, in 58 sanitary areas in Kent, Sussex, and Surrey, compared with variations in agricultural employment and in age distribution of females in those areas.

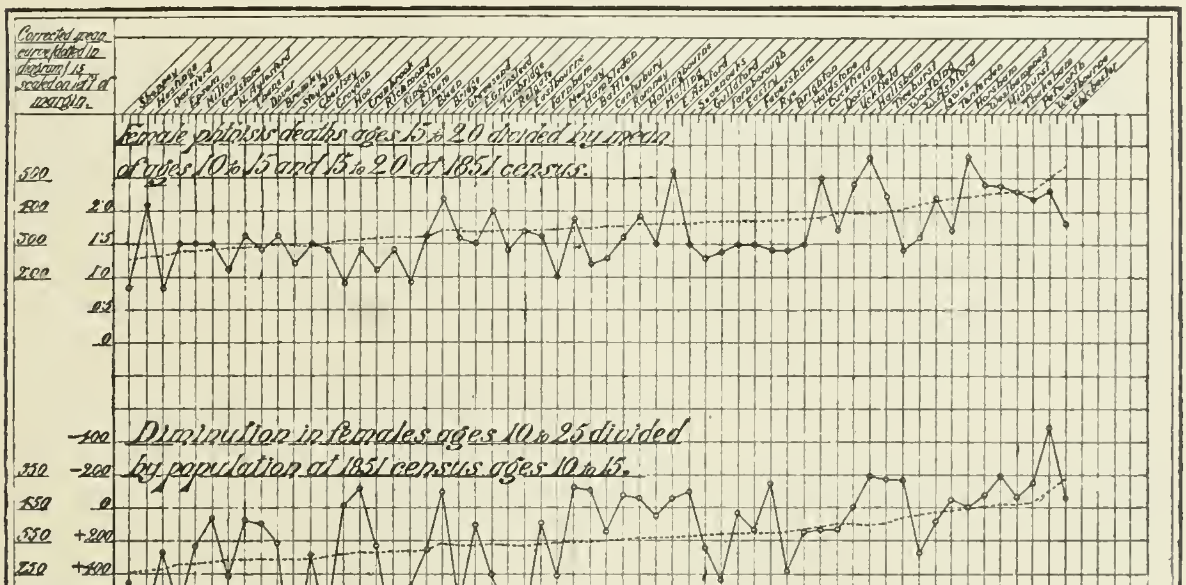


DIAGRAM V.

the rapidly growing towns, favour the collection of evidence as to the effect of migration upon death-rates from phthisis in that decade. The geologist who sees in some valley among the mountains certain rounded hillocks, recognizes that he has evidence of the former existence of a glacier; but he knows quite well that these hillocks cannot be plainly discerned in every valley into which a glacier has descended. Careful consideration emphasizes, in a similar way, the conclusion that the statistics of Thakeham, Westhampnett, and the other villages, present clear evidence of the influence of migration upon phthisis mortality fifty years ago, and that, notwithstanding the fact that similar evidence is not obtrusively apparent on study of the figures of later decades.

If, therefore, I have carried you with me thus far I will ask you to follow up the clue and see if it affords help in dealing with a larger problem. Sir Shirley Murphy pointed out at York that "the death-rate from all causes, in England, fell from 22 in 1875 to 16 in 1901-05, or six in the thousand of population; the phthisis death-rate fell in this period from 2·2 to 1·2, or one in the thousand of population; hence the decline in phthisis is responsible for one-sixth of the decline from all causes." He added, "I think we may say that nearly two-sixths of the decline in the total death-rate has been due to decreased mortality in epidemic diseases, the trend of which is governed, in the main, by the natural behaviour of these diseases; that one-sixth of the decline in the total death-rate has been due to decreased mortality from phthisis, which in various parts of Europe was manifested before any of the prevailing views of prevention could have been applied, and which has, probably, not been materially disturbed, in one or other direction, since, by any of the measures which have been adopted in recent years; and that the remaining three-sixths of the decline of the total death-rate has been shared among the causes of mortality, for which particular methods of prevention, as applied to populations, have hardly been discussed."

The question now arises as to how much of the decline in the general and phthisis death-rates is due to migration. That the problem is one needing careful investigation is obvious. During the period 1861 to 1911 the population of the United Kingdom increased from 30 to 45 millions (that of England and Wales from 20 to 36 millions); during this period about 10 million natives of the United Kingdom emigrated to extra-European countries (6 millions English, a million Scottish and 3 millions Irish); during the same period some 40 million deaths occurred. It is clear that the figure for emigration—10 millions—representing as it does about one-quarter of the total number of deaths in the whole period—must be regarded as constituting a very disturbing element. There is, however, a large amount of immigration; but this, so far as gross numbers are concerned, does not entirely counterbalance the emigration. In England and Wales the total loss of population by excess of emigration over immigration in the fifty years was upwards of one million (*see* Census Gen. Rep., 1901, p. 16). This million represents the difference between a net loss of some 6 million native population and a presumable gain of some 5 million foreigners. The assumption has commonly been made that the immigrants may be set off against the emigrants, and that the total effect upon the general and phthisis death-rates is thus a negligible one. Before acceding to this view it is necessary to have regard to the character of the incoming and out-going populations—(1) as regards age, and (2) as regards power of resisting disease.

(1) *The Ages of the Populations.*—This question has been discussed in detail in the General Census Report of 1901. Tables 18 and 19 show the excess or deficiency of the enumerated, as compared with the calculated, numbers of males and females at the different age-periods, at successive census enumerations. The results are considered at three groups of ages:—

(*a*) At ages over 55 the figures appear to be affected to some slight extent by balance of migration, but in any case, the effects of migration and of errors of all kinds so nearly neutralize one another that the extreme variation between the calculated and enumerated numbers does not exceed 1·26 per cent. of the former.

(*b*) At ages under 15, misstatement of age, in particular the tendency to return children at their age next birthday instead of their age last birthday, has undoubtedly operated; but on throwing together the three five-year age-groups under 15 years, there is a total deficiency representing the balance of migration outwards, but this "is hardly likely to exceed the small fraction of 1 per cent. of the population affected."

(*c*) The age-groups from 15 to 55 in males and females alike, with the two exceptions, 20 to 25, and 25 to 30 in females, almost invariably show a deficiency of the enumerated numbers, representing a balance of loss by migration at these ages; and the general conclusion may be formulated, therefore, that the age-groups 15 to 55 are predominantly represented in the figures relating to persons emigrating from this country. The striking exception presented by females 20 to 25, and 25 to 30 is examined at length in the Census Report, and the conclusion is reached "that a considerable number of females under 20 years of age have returned themselves as over 20, and that very large numbers between 25 and 40 have understated their ages. The following table is given :—

FEMALES: ON THE ASSUMPTION THAT THE RETURNS OF AGES ARE CORRECT, THE BALANCE OF GAIN OR LOSS BY MIGRATION IN INTERCENSAL PERIODS.

	1851-61	1861-71	1871-81	1881-91	1891-1901
All ages	−42,099	−52,143	−59,917	−201,221	+63,094
15-20	−8,263	−16,402	−19,969	−37,440	−14,124
20-30	+113,414	+114,826	+119,224	+90,526	+167,882
30-40	−133,076	−128,536	−126,814	−158,790	−100,060
40-50	−1,267	−6,882	−4,021	−19,074	−9,810
All other ages	−9,907	15,149	−28,337	−76,448	+19,206

The writers of the Report say: "An interesting puzzle for the curious would be to discover at what ages female emigration and immigration must take place in order to produce such results as these." They suggest that a solution of the problem is forthcoming if it may be assumed that "the whole of the emigration and immigration takes place immediately before a census"; if, in fact, "the meaning of the term 'migration' be extended to cover transfer by incorrect statement of age, from one age-group to another age-group. And this is undoubtedly what has happened. There has been migration (in the extended sense) from both of the age-groups 15 to 20 and 25 to 30 into the intermediate group 20 to 25; migration from the group 30 to 35 into the group 25 to 30; and so on, the process probably terminating not far from age 50."

There is, perhaps, room for scepticism as to whether the practice among females under 20 years of age of returning themselves as over 20 is so common as the writers of the Report suppose. The thesis with regard to misstatement of age has been so enthusiastically defended by its formulators, that they have not paid much attention to the main conclusion to be drawn from study of their figures, they have, indeed almost failed to see the wood on account of the trees. They themselves in commenting (p. 18) upon the apparent gain to the female population, over and above that due to the recorded natural increase, in 1851-61, 1861-71, and 1891-1901, say: "It should, however, be borne in mind, that no record exists of the amount of migration from time to time between Scotland and England and between Ireland and England, and it may, further, be noted that the enumerated population in England and Wales included 153,395 females born in Scotland and 201,598 females born in Ireland. As the number of females born in England and Wales and enumerated in Scotland and Ireland did not exceed

68,072 and 31,880 respectively, the gain to the enumerated English female population under consideration may probably be due in great measure to this cause." If the writers of the Report had considered this probability in connexion with their observations concerning misstatement of age, they would, it may be presumed, have laid rather less stress upon such supposed misstatement. They say, "Were the enumerated numbers correct, there must have been, in each intercensal period, a constant flow of young female emigrants, who would reach ages of between 15 and 20 years at the next census, and of older emigrants who would reach ages between 30 and 65 years of age; and a stream of immigrants who would reach the intermediate ages 20 to 30." It may be contended that the known facts concerning drift from Scotch and Irish rural districts to this country rather support the correctness of the enumerated numbers upon which the writers of the Census Report cast doubt, and they at any rate somewhat mitigate the gravity of the sweeping indictment which they have brought against the female portion of the nation.

(2) *Disease-resisting Capacity.*—As regards the immigrant population, this subject has been a battle-ground of controversy for the past twenty years. Sir Shirley Murphy has investigated the subject in connexion with the alien population (mainly Polish Jews) in certain parts of Stepney, and again with the population in the Italian quarter in the neighbourhood of Saffron Hill. Both these inquiries yielded evidence that the disease-resisting power of the populations concerned was greater than that of persons of similar social status but of native origin. This was especially borne out when consideration was limited to phthisis, and in dealing with the Italian population the fact was elicited that the young Italians who emigrate to this country frequently, on becoming phthisical, return to their native villages and die there.

No such precise information is available with regard to the emigrant population. We have to remember, however, in the first place, that the ages at which phthisis prevails are broadly the emigrating ages;[1] and that from time immemorial sea voyages and change of air have been prescribed for consumption. The emigrants, then, include many well-to-do invalids, and, further, many wage-earners, who have been advised to seek work in Australia, the United States, Canada, South Africa, or elsewhere. With regard to the former, it can only be stated quite generally that the total number of deaths from phthisis of natives of England and Wales occurring annually in various health resorts (in Switzerland, Southern Europe, North and South Africa, America, and elsewhere) probably runs up into thousands. During the last fifty years, moreover, increased facilities for travel have led, in numerous instances, to the sufferer from phthisis going farther and farther afield. But these declared invalids constitute only a comparatively small section of the population: the question which really interests us is this: Of the two million and more emigrants to British North America, of the five or six million to the United States, of the million and more to Australia and New Zealand, of the half-a-million emigrants to South Africa during the past half-century, how many, if they had remained at home, would have died here from phthisis?

---

[1] The figures for Ireland show that in successive decades, from 1871 to 1900, 73·1 per cent., 75·9 per cent. and 83·7 per cent. of the emigrants were between 15 and 35 years of age.

That the number must at least be considerable will be realized by anyone who even cursorily investigates the extent to which those of whom he and his friends have personal knowledge die abroad. Thus, ten individuals who have noted the facts have supplied me with figures giving a total of 311 deaths, at ages 15 to 55, including 242 occurring in this country and 69 occurring abroad; there were in all 118 deaths from phthisis, 90 occurring in this country and 28 abroad. The figures are small, but they at least suggest that it would be profitable to extend this line of inquiry.

Some light may be thrown upon the question by study of international statistics. The general death-rates of European countries, with the exception of Roumania, Bulgaria, Servia, and perhaps Russia, show decline, and in this connexion the fact must not be lost sight of, that Europe has contributed upwards of 20 millions of emigrants towards the population of the North American communities. Mr. J. D. Whelpley, in "The Problem of the Immigrant," states that "in the earlier years the movement was from Germany, Scandinavia, Denmark, Holland, and France. . . . The people of other nations such as Italy, Austria, Russia, and Hungary then began to move." As long ago as 1860 France attempted, by legislation, to control the amount of emigration; Belgium followed in 1886, Switzerland in 1888, Germany adopted a stringent law in 1897, Italy in 1901, Hungary in 1903, and Austria in 1904. The Americans, on their part, have endeavoured to place some sort of restriction upon immigration, but it was not until 1903, when the existing Immigration Act came into force, that the question was treated very seriously.

Whatever effect may have been exerted upon general death-rates by the large volume of emigration, there can be no question that a still more disturbing influence has been exerted upon phthisis death-rates. The emigrants have been to a preponderating extent persons at the phthisis ages, and not a few have emigrated for health reasons. During recent years many have, indeed, actually been sent back to Europe on the ground of ill-health. Thus Mr. Whelpley states: "During the past year (1904) about 8,000 aliens were refused admission to the United States after being brought to an American port, and they were sent back. Of those deported about 4,800 were paupers, 1,600 were diseased, and 35 were convicts." Particulars are, moreover, now coming to hand with regard to some of these deported cases. Again, there are the protests entered from the Colonies, from the middle of the nineteenth century onwards, as to the arrival of tuberculous cases (*see*, for example, *British Medical Journal*, August 10, 1912). The evidence under the above heads is mainly of recent date, and it relates, of course, only to advanced cases of the disease. It will be convenient to defer for the moment dealing with the question of statistical evidence from reports of the medical officers of health from colonial cities.

On examination of the phthisis death-rates of European countries it will be found that some of them, notably, for example, England, Germany, Denmark, Belgium, and the Netherlands, show a marked reduction; others, like France, Switzerland, Austria and Italy are more nearly stationary; while those of Ireland, Norway, and Hungary exhibit apparent increase.[1] If migration has played any considerable part in determining these changed death-rates, it cannot be mere quantity of migration that has been in question. The emigrant from a country which is increasing in prosperity will, it may be anticipated, differ in *quality* from the emigrant from a country whose prosperity is declining. Considered from this point of view, it will be noted that the European countries the prosperity of which has greatly increased, and from which there has been considerable emigration—those which might be expected, a priori, to have eliminated the least desirable and least resistant material—England and Germany, for example, are countries in which the decline of the phthisis death-rate has been especially marked. France and Austria, with their stationary populations, have stationary phthisis-rates; while Norway, Ireland and Hungary, with a large amount of emigration, accompanied by political unrest, show increasing phthisis-rates.

---

[1] In the case of Norway the death certification was incomplete in the earlier years, and the figures for Hungary only go back to 1897. Figures are given by the Registrar-General relating to the Colonies of Australasia; these show, as a rule, some increase in the eighties, but general decline since. Figures are also given for Jamaica, Servia, Chili (practically stationary), and for Ceylon and Japan (marked increase).

The suggestion that countries of stationary or declining prosperity are apt to lose their more enterprising and energetic inhabitants has been especially examined in relation to Ireland. The question was referred to in Dublin, in 1907, by several of the lecturers at the opening of the Tuberculosis Exhibition. The view taken generally was that emigration had had a great deal to do with the behaviour of phthisis in Ireland. Sir William Osler stated it as his belief that the most important single cause for the increase of tuberculosis was "the drainage from Ireland, by emigration, of the healthy." Sir Shirley Murphy referred to the important part played by emigration, and the need for studying its effect in relation to departure and return of both fit and unfit. The Irish official evidence was to a similar effect.

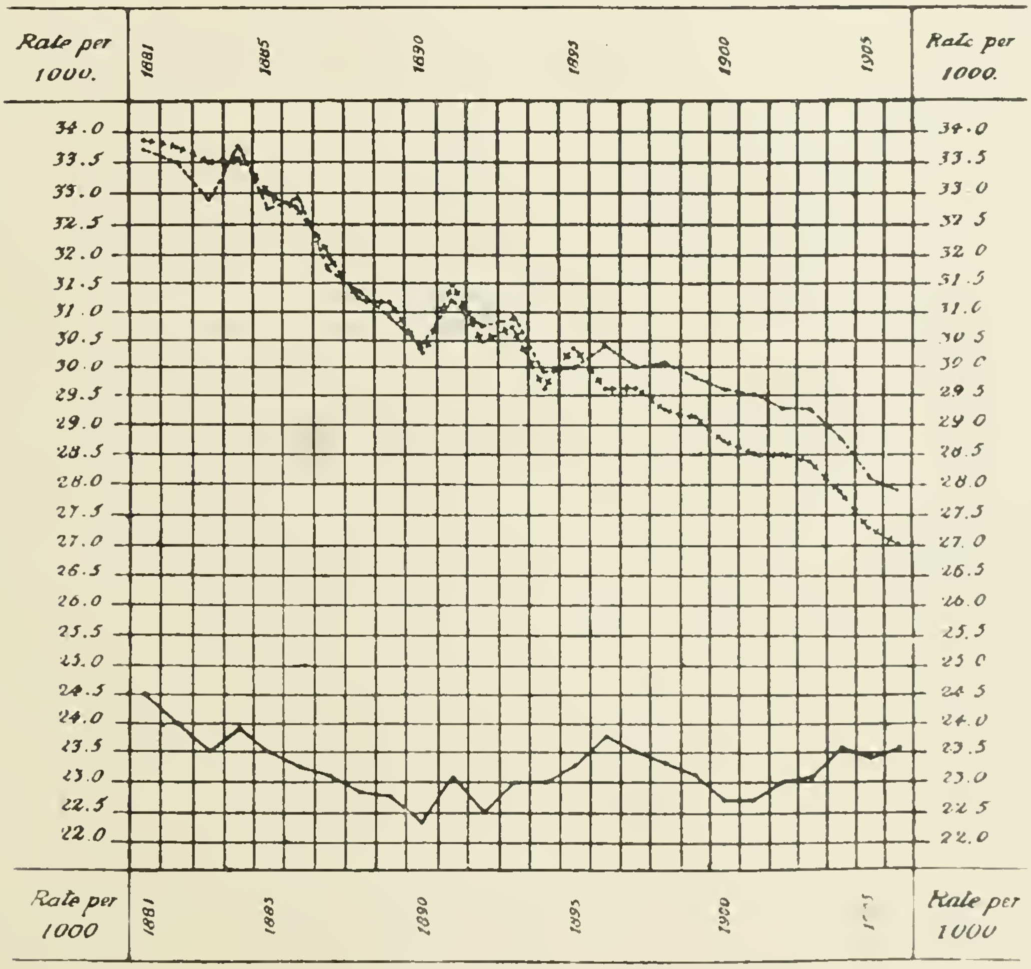
It will be convenient to defer dealing with special points raised by those who attach great importance to emigration in relation to phthisis, and to refer first to the objectors. Sir John Byers, Professor of Midwifery in Queen's College, Belfast, considered that there are serious scientific objections to the generally accepted view.[1] These are: (1) That in Belfast, which attracts the robust and strong, the death-rate from tuberculosis is high. (2) That Belfast also attracts persons between the ages of 15 and 35, and yet it has a high tuberculosis-rate. (3) That the Irish birth-rate has actually increased. (4) That "if the cause of the high tuberculosis death-rate in Ireland be the physical decadence of the people of Ireland, what must be concluded with regard to the condition of those who leave our shores for America?" The Irish in America, it is argued, have a high death-rate—"those who emigrate are no better than those who remain behind." (5) That Belfast has suffered least from emigration, and yet its phthisis death-rate is high. (6) That "in a recent examination of recruits the smallest number of rejections was among the Irish." (7) That, as pointed out by Dr. Newsholme, "in the past it was the small farmers, the cottiers, and the labourers who emigrated in the largest numbers, and these, owing to their extreme poverty, must have been among the least fit."

It is not now practicable to make detailed inquiry into the special circumstances of Belfast. A number of interesting problems arise in this connexion, but they are those of a large city increasing in prosperity and in population, and presenting occupational and other peculiarities which undoubtedly overshadow the influence of emigration.

---

[1] "Ireland's Crusade against Tuberculosis," vol. i, p. 65, and "Why is Tuberculosis so Common in Ireland?" *Lancet*, 1908, i, p. 210.

Comparative Birth Rates, England, Scotland and Ireland.



ENGLAND + + + + + + +

SCOTLAND - - - - - - - - - - -

IRELAND ————————

Margin of Variations between highest and lowest rate (1881-1906).

England,	6 9 per 1,000	-	20 4%
Scotland,	5 8 „ „	-	17·2%
Ireland,	2 2 „ „	-	0%

DIAGRAM VI.

(Diagrams VI, VII and IX are reproduced from diagrams in "Tuberculosis in Ireland.")

The fact that Belfast is exceptional really favours the conclusion that the rule, formulated with regard to the rest of Ireland, holds good. As to the argument from the birth-rate, little weight can be attached to it.

During the decade 1881-90 the Irish birth-rate was declining; since 1890 it has shown slight recovery (diagram VI). If importance be attributed to this increase, it may be urged that Dr. David Heron has shown[1] that in every case (save cancer) there is "a positive correlation between an undesirable social feature and a high birth-rate, and a negative correlation between a mark of a well-to-do population and the birth-rate." As regards the *recent* examination of recruits, and the *early* emigration of the cottiers (for it is to the emigration following upon the famine of 1847 that Sir J. Byers presumably more especially refers), these do not throw any direct light upon the question of an apparent rise in the phthisis death-rate in the late sixties and seventies.

The point raised with regard to the Irish in America is, however, an interesting one, and it must here be carefully considered, for some importance has been attached to it by American statisticians. The case has been concisely set out by Dr. Newsholme in his book, "The Prevention of Tuberculosis" (pp. 218, 219). After stating that he does not lay stress on such points as the birth-rate and the cottier question already mentioned—for, as he says, "these considerations are to some extent inferential"—he proceeds, "It is possible to settle the question definitely by actually following the emigrated population and comparing their susceptibility with that of the residual Irish." He quotes the high Irish phthisis death-rates in the American Census Report for 1900, but these, he notes, are uncorrected for age-distribution. He turns, therefore, to the vital statistics of the City of Providence, Rhode Island, and cites Dr. Chapin's figures, "which enable a corrected comparison to be made." . . . "The death-rates from phthisis in Ireland in 1901, for sex- and age-periods, were," we are told, "applied to the population of Providence, in 1900, born of Irish mothers. It was found that the theoretical mortality from phthisis of this element of the population (of Providence) according to these (the Irish) data, was 258 per 100,000 living. The actual rate for the period 1896-1905 was, however, 339. The mortality from phthisis of the Irish in Providence is, therefore, 81 per 100,000, or 31·4 per cent. more than the mortality of the Irish in Ireland."

The American Census statistics relate, as is well known, to a portion only of the United States, comprising mainly urban populations, and thus including the poorest inhabitants of the large American cities. This is a more serious matter than the question of age-distribution.

---

[1] "The Relation of Fertility in Man to Social Status," 1906.

Further, the Irish population of Providence only numbers a few thousands; the city in 1900 had, in all, only 175,597 inhabitants. Table xviii of the City Registrar's Report for 1906 shows that of the 5,456 births in that year, 628, or 11·3 per cent., were births of Irish mothers, and in 494, or 7·9 per cent. of the births, the father's birthplace was Ireland. The constitution of the population has, moreover, greatly altered in the last sixty years, for in 1856-60, in 43·11 per cent. of the births the father's birthplace was Ireland, but this percentage had fallen in 1906 to 7·50. We have to deal, therefore, with quite a small population, and one disturbed in a marked manner by migration. Further, prior to 1911, no correction was made for outlying institutions, and Dr. Chapin writes, in that year, "the figures formerly given of the number of deaths from pulmonary tuberculosis in Providence were misleading."

The analysis by the Census Office of the deaths at ages from phthisis in the registration area of the United States, however, broadly confirms the above results. An important fact is brought to light by the figures for Boston which, like other large cities, shows excessive incidence upon the Irish population. According to the census of 1900,[1] 31 per cent. of the population had mothers born in Ireland, but no less than 36·5 per cent. of all deaths were of those having mothers born in Ireland. In 1910 this percentage had declined to 32·8 per cent., although "it seems probable that this (the Irish) division of the people still maintained its 31 per cent. of the City's population." The rate for pulmonary tuberculosis "among those having mothers born in Ireland," for the age-period 30 to 35 years, was more than twice those of the English, Scotch, and native Americans. The deaths in the decade 1900-10, however, fell "from 653 to 490, a decrease of 25 per cent., a most excellent showing; though, even in 1910 the 490 deaths represent 45 per cent. of all the deaths from pulmonary tuberculosis, indicating that the Irish are still unduly handicapped by this disease." The writers of the *Bulletin* are at a loss to account for the high rates among the Irish, though, they say, "the severe winters and the excessive use of alcohol are undoubtedly important factors." The marked discrepancy between the rates in 1900 and 1910 is especially noteworthy, and suggests the possibility that the application of the deaths to the population may be attended by some serious source of fallacy, and further that variations in the volume of Irish emigration may have to be reckoned with.

---

[1] *Monthly Bulletin* for May, 1912, i, No. 5.

It is clearly unjustifiable to apply statistics relating to the Irish in Providence, or to the Irish in Boston, to the whole Irish population of America; or to compare the population of Providence or Boston with the residual Irish in Ireland. Dr. Newsholme has told us that "in every country town life has been associated with a greater prevalence of tuberculosis than has country life" (loc. cit., p. 223); and this despite the fact that "the towns attract the robust and strong, while the weakly tend to remain in and return to the country districts." If urban statistics could be corrected for these last-mentioned circumstances, the extent of the mischief wrought by the towns would, he says (p. 221), "be exhibited more strikingly, and even more accurately."

There seems to be no doubt that America has, to a large extent, played in regard to Ireland the part assumed by the towns in relation to rural districts in other countries, and the four million emigrants, between 1851 and 1910, must in such case have included a large proportion of the more fit, and presumably the more resistant, to disease. The phthisis death-rates among the Irish in the American cities, if they are to be weighed in the balance, should, moreover, at any rate be compared with the corresponding rates among the Irish in the cities of Ireland, and not with those in Ireland as a whole.

If like be compared with like, the case for an "original racial tendency to tuberculosis" is unconvincing. The writers of "Tuberculosis in Ireland" are definitely of this opinion, and they refer to the favourable rates from phthisis in Ireland, at the lower ages, as having a bearing on the question (p. 39). O'Farrell and Courtenay, however (cited by Bulstrode, p. 83) think that "just as the Irish famine was, apart from its direct effects, responsible for so much physical disease in the country," so, it may be, "innutritious dietary, and other deprivations," may have acted upon the nervous system also—in other words, increase of phthisis and increase of insanity alike, in recent years, are, they consider, an ultimate outcome of the famine and succeeding epidemic prevalences. It is scarcely likely, however, that these effects could have left their mark upon the second and third generations, and have had no influence upon the first; and yet this is what we are asked to believe. It will be remembered that the recorded phthisis death-rates, prior to 1864, represent the low level from which the apparent rise of the seventies and eighties was manifested. The two writers quoted are, therefore, on the horns of a dilemma. If they advance racial degeneration as a cause of increase of phthisis, they must repudiate reliance upon the early death-rates; if, on the other hand, they recognize that these early rates are understated, the apparent rise of phthisis in recent years disappears. As Professor Lindsay, of Belfast, says, "we must not admit that the Irish race have any racial tendency to tuberculosis"; and he adds that if certain individuals in America suffer beyond the average of other races, "we should be inclined to blame, not exactly their racial characteristics, but rather the conditions of life under which they live in the United States of America."[1]

The Irish witnesses, as a whole, then, deny an original racial tendency to phthisis. They, however, are inclined to admit loss by emigration of the fit. On the other hand, Dr. Newsholme, while he agrees that this last-named opinion is widely held, himself strongly opposes it (p. 217). He relies mainly on the arguments from the death-rates in American cities, which have already been referred to; but he also lays stress upon the improvement which he urges has been manifested in the social condition of Ireland in recent years. Thus he quotes Tables liii and liv, from a Report by Mr. Wilson Fox, which make comparison between the wages of agricultural labourers of England and Wales, Scotland, and Ireland; these tables show, it is true, that during fifty years wages in Ireland have increased, but they forcibly illustrate, at the same time, how notably the average wage in Ireland comes short of that in other parts of the United Kingdom. Again (loc. cit., p. 227) extracts are given from a paper by Sir R. Matheson, indicating that "the material improvement in the housing of the people of Ireland, since 1841, is very satisfactory, but that there is still much to be accomplished." Fig. 19, on p. 227, of "The Prevention of Tuberculosis" shows, however, that the changes held to indicate the improvement in question took effect in the main prior to 1861, and they were, doubtless, due, as Sir R. Matheson has pointed out, to the depopulation caused by the famine and succeeding epidemic prevalences. "Everywhere," as Sir Robert says, "throughout the west and south of Ireland, vast numbers of (these little) habitations were left desolate, the inmates having either perished from the famine or the fever, or sought refuge from their misery in emigration." Dr. Newsholme, on the whole, concludes (p. 250) that "the economic condition of Ireland has not become worse, and that so far as can be measured by the tests already given, it has improved. . . . Food has become cheaper, rents are low, overcrowding has declined, and is less marked than in Scotland." On the other hand, Mr. W. P. O'Brien, one of the Assistant Commissioners to the Royal Commission on Labour (vol. iv, p. 245), says, "It will probably be accepted as a fairly well established position, that in few, if any, of the countries with the affairs of which we are conversant, has the condition of the class of agricultural labourers in regard to house accommodation ever been known to sink to a lower level of general wretchedness than that very largely reached in Ireland in even modern times."

---

[1] Ireland's Crusade against Tuberculosis," vol. i, p. 108.

It is necessary to keep constantly in mind the fact that the observed rise in the phthisis death-rate of Ireland dates from 1864 (the year of inauguration of compulsory registration), and if we incline to regard it as representing a real, and not a mere apparent rise, and desire to correlate it with various social conditions, it is to the Ireland of the sixties to the eighties, and not to the Ireland of the present time, that we must turn. The conditions obtaining in the north and west of Ireland, then, at any rate, were most unfavourable. Dr. J. Stewart Mackintosh[1] has given a graphic description of the state of affairs in the west, "in the notorious congested districts, groups of cabins dotted haphazard over the country side, and inhabited by listless scarecrows clad in rags of rags. Here famine and pestilence hold perennial sway, and only those who have seen the full development of these plague spots in the remoter promontories and peninsulas of Connaught can believe that such places could exist within the confines of the British Isles." "One thing alone," he says, "stirs the breasts (of the people) with hope—the sound of the Atlantic tides that ebb and flow about their coasts. Beyond it are cousins, brothers, sons, who have managed by hook or by crook to cross the sea." And then, he adds, "Have these gone to swell the ranks of the inefficient in other communities? On the contrary, the New World has drawn some of its most hard working labourers from among them. . . . Men who develop a surprising physique and energy as soon as they can enter environmental conditions at all conformable to their physical needs."

One of the difficulties in dealing with Ireland is the great uncertainity as to the value of the statistical records. Dr. Newsholme, as has been seen, originally sought to avoid the migration difficulty by directing attention to national statistics; but by a curious irony the main battle-ground, in the argument raised by him, proves to be Ireland—for that country constitutes, as he believes, an exception in the matter of phthisis isolation, from which he seeks to prove his rule as to the influence exerted by segregation. It is upon Irish statistics, then, that the light is chiefly focused. In attempting to avoid the migration difficulty, we are thus obliged to concentrate attention upon a population which has lost nearly four millions by emigration within living memory, and with a view to escaping statistical error we are instigated to study figures which, beyond almost any others we know of, need to be treated with circumspection and reserve.

---

[1] *Brit. Med. Journ.*, 1912, ii, p. 370.

The early phthisis-rates are unquestionably understated. Sir R. Matheson says that, up to 1864, there is no doubt the figures are "considerably under the truth." For some years succeeding 1864 they are much lower (*see* diagram VII, which is a reproduction of a chart in Dr. Bulstrode's Sanatorium Report) than those of England and Wales and Scotland, and this is quite at variance with all we know of the social condition and degree of prosperity of the several populations in question. The Irish vital statistics and records of pauperism are, moreover, well known to be far less reliable than those of the other two countries. Dr. Newsholme thinks (loc. cit., fig. 30, and pp. 249 and 250) the Irish pauperism of the last thirty years overstated; "change in administration must have produced an increased number of paupers for a given amount of destitution." But the recorded Irish total pauperism is, even now, only about the same as the Scotch, and rather less than that of England and Wales, and it is, of course, impossible to accept the view that the Irish poor are better off than those of this country. Dr. Newsholme, indeed, speaks (loc. cit., p. 217) of the "undoubted general poverty" of Ireland. Again, he agrees (p. 250) that the earlier as well as the latter part of the Irish curve of pauperism stands in need of adjustment.

It is clear, therefore, that comparison cannot satisfactorily be made between the Irish phthisis death-rates of an earlier and a later period, or between Irish, and English and Scotch phthisis death-rates; and, again, that comparison cannot safely be instituted between the recorded Irish pauperism of an earlier and later period, and between Irish pauperism and English and Scotch pauperism. In such a maze of difficulties it is hazardous to attempt to deal with "proportional figures" and "segregation ratios." It is much safer to study the actual rates, and one fact must clearly be realized from examination of these—namely, that the ratio of indoor pauperism per 1,000 of the population has remained practically stationary in all three countries, and has throughout been highest in Ireland. It has, indeed, been suggested (loc. cit., pp. 282-84) that there are certain differences between the Irish and English character, which lend support to the view that "institutional segregation" is of "lower specific value" in Ireland than in England. But even if this were the case, the peculiarities referred to have presumably obtained throughout the entire period, and the fact, if established, could only tend somewhat to reduce the value of institutional segregation in Ireland throughout the whole time of observation. It cannot, however, be contended that it would reduce it, say, below that of Scotland, for which the records show only one-fourth the indoor pauperism of Ireland. Yet in Scotland recorded phthisis has diminished while in Ireland it has increased. If any value at all is to be attached to the comparison between the two countries, it is quite clear that the efficiency of institutional segregation has not had any appreciable influence upon phthisis-rates, for Scotland with less segregation shows marked decline, while Ireland with more segregation shows slight increase.

There is the further consideration that if it be argued that the institutional segregation of phthisis in Ireland has diminished in efficiency down to our own time, it must be held that on going backwards there should be notable improvement in this respect. Did time permit, the impossibility of making such admission might be illustrated at length from the official records. Some conception of the conditions obtaining in Ireland in the early days may perhaps best be obtained from study of the recent Report of the Poor Law Commissioners. They quote the Census Commissioners of 1851, who in commenting upon the decennial decrease of 1,622,739 in the number of inhabitants, point out that the population on March 30, 1851, should have numbered 9,018,799 instead of 6,552,385, and that consequently the loss of population between 1841 and 1851 may be computed at the enormous amount of 2,496,414 persons. The Royal Commission Report of 1909 adds, "These figures show that two and a half millions of persons *have to be accounted for*. Of these the number that died of starvation, and of fever and dysentery consequent on starvation, is estimated at over 1,000,000. Emigration, which was very active during those years, carried away the remainder. But disease followed them into the emigrant ships, and even to their homes in the new country, and about 20 per cent. of the emigrants died." These, then, were the days of comparatively low and undoubtedly understated phthisis death-rates in

CHART INDICATING THE BEHAVIOUR OF TOTAL PAUPERISM, PHTHISIS DEATH-RATE AND INDOOR PAUPERISM IN EACH DIVISION OF THE UNITED KINGDOM DURING THE LAST 50 YEARS

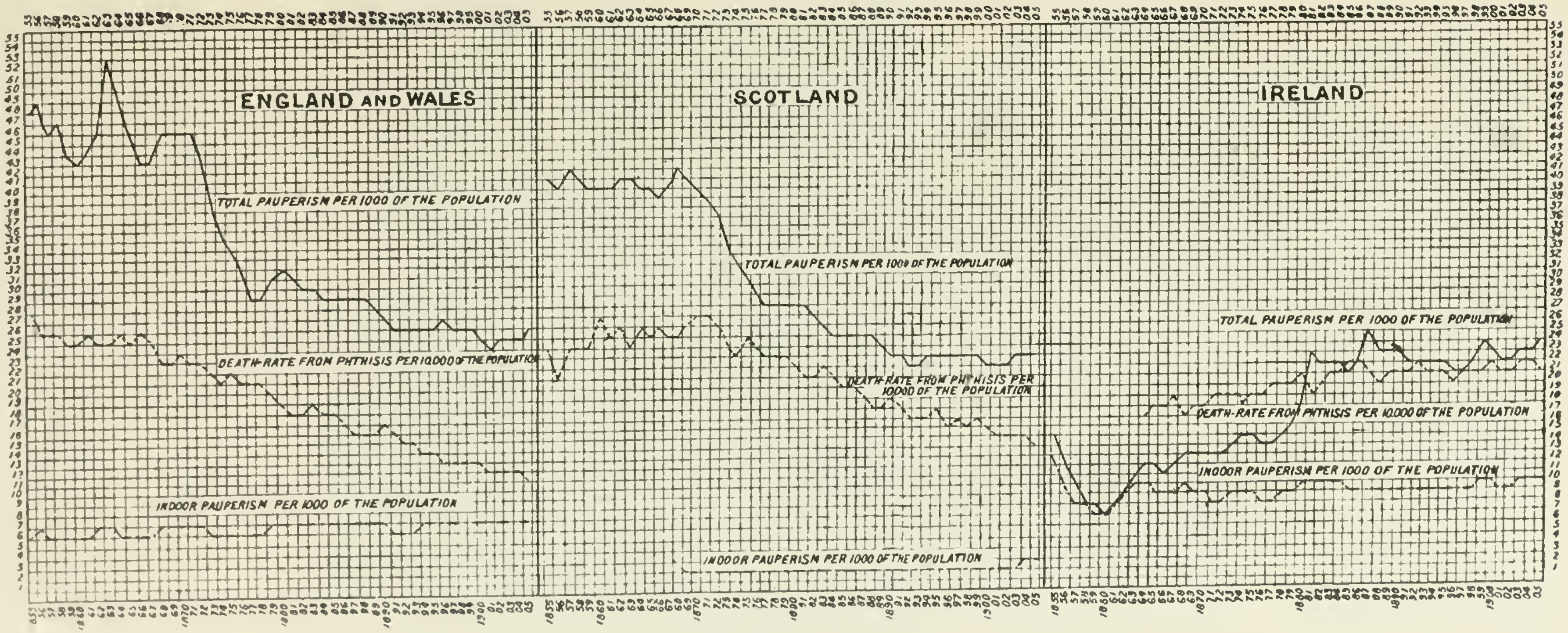


DIAGRAM VII.

Ireland; we clearly cannot accept the view that they were also days of efficient segregation.

Of course, the main difficulty with regard to the Irish figures is the huge volume of the emigration. The annexed table gives the particulars extracted from the successive census returns. From 1841-61 there was a decline of nearly 2½ millions: from 1861-1911 there has been a further decline of nearly 1½ millions.

	Population	Decennial decrease		Per cent.	
1841	8,175,124	Increase	407,723	Increase	5·25
1851	6,552,385	Decrease	1,622,739	Decrease	19·85
1861	5,798,967	,,	753,418	,,	11·50
1871	5,412,377	,,	386,590	,,	6·67
1881	5,174,836	,,	237,541	,,	4·39
1891	4,704,750	,,	470,086	,,	9·08
1901	4,458,775	,,	245,975	,,	5·23
1911	4,381,951	,,	76,824	,,	1·7

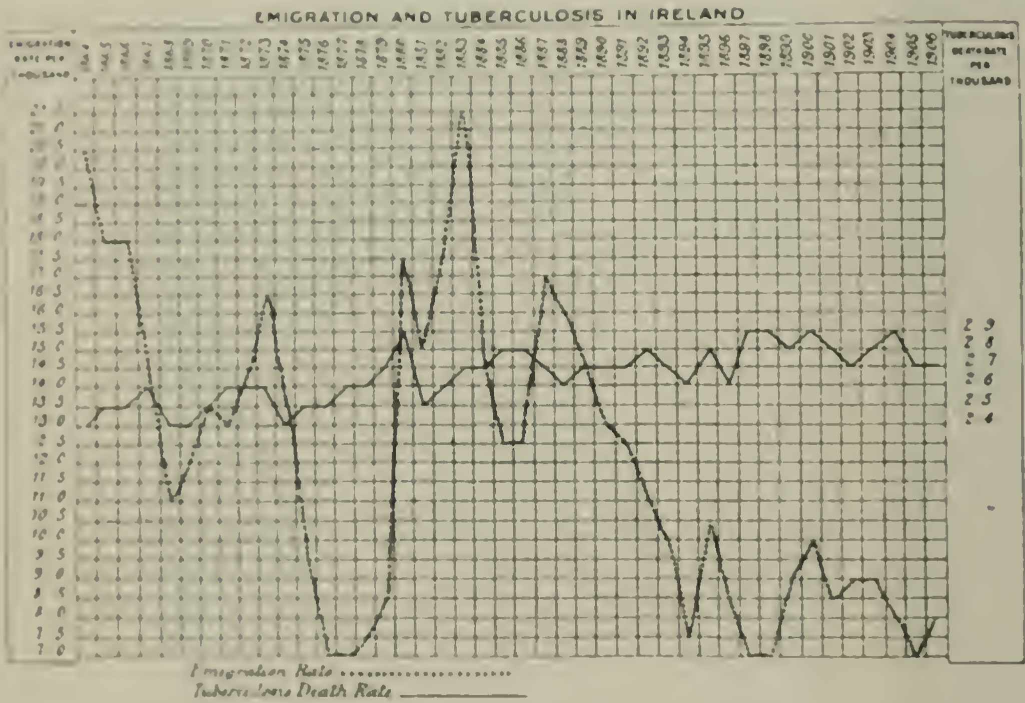


Diagram VIII.

From May 1, 1851, to December 31, 1910, the Irish emigrants numbered 4,187,443. To obtain an approximately true measure of phthisis mortality in Ireland during the last sixty years we need to take account not merely of the 6,552,385 in 1851, and of those born in Ireland since 1851, but also of the 4,187,443 emigrants and their descendants. The numbers of the last named and the deaths occurring outside Ireland cannot, of course, be ascertained. The difficulty has always been glossed over by assuming that the effects produced by emigration and immigration balance one another. This is an entirely unsafe assumption where emigration has taken place upon the scale exhibited in Ireland. Obviously a great deal turns upon the ages of

Comparative Death Rates, England, Scotland and Ireland.
Deaths from all causes.

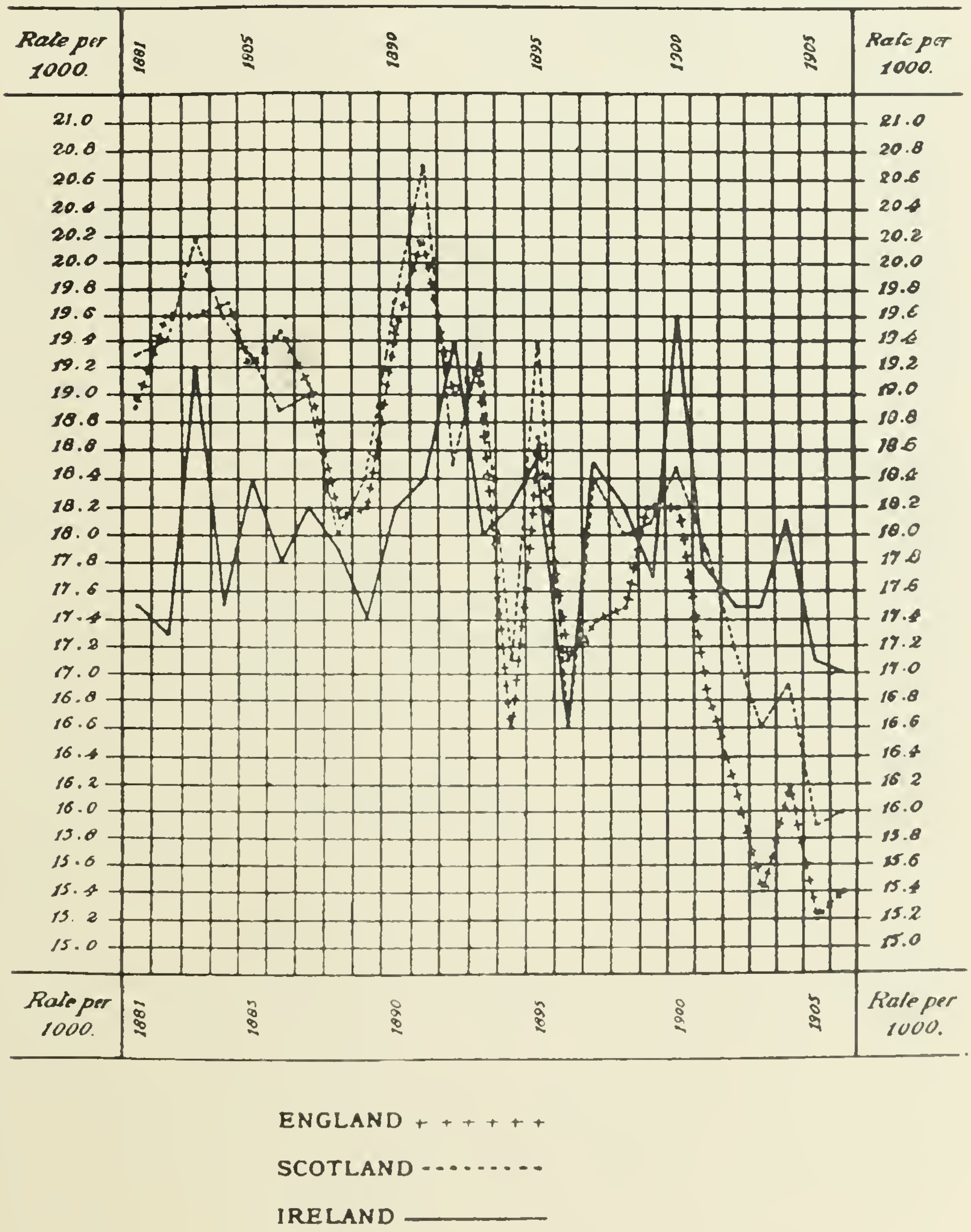


Diagram IX.

the emigrants, upon their quality as regards resistance to disease, and upon the ages and conditions as to health of such of them as return to their native country.

Sir R. Matheson, writing officially as Registrar-General, said, "Emigration has removed the able and healthy, and thus left amongst the residue an increased percentage of the enfeebled and persons less able to withstand the attacks of disease." He lays stress, moreover, on the fact that the Irish death returns are swelled by "returning Irish Americans" and by "migrating labourers" from England. He gives details on this point in his paper (loc. cit., vol. i, pp. 34 and 35). In the official report on "Tuberculosis in Ireland" we read, "An appreciable number of our emigrants who suffer from slow wasting diseases such as consumption return to Ireland to die." The writers of this report further say, "As a rule the healthiest and most intelligent member or members of the family are selected to go forth. . . . The steady drain upon the youth of the country, male and female alike, . . . may be regarded as a possible contributory cause to the death-rate from consumption." They add, however (p. 50), that if emigration had caused deterioration of the race it should "equally affect the general death-rate"; and that the country districts should suffer more than the towns, "seeing that the greater portion of the emigration is from the rural districts." As regards the general death-rate, comparison of the rates of Ireland, and England and Wales and Scotland, reveals the phenomena this theory would lead us to expect (diagram IX). As the Report itself states (p. 6), in commenting upon the general death-rate, "Ireland has not shared in the remarkable reduction of mortality that has taken place in England and Scotland." As regards the rural districts, the mortality from phthisis is higher than in rural districts in this country, though it is notably less than in the Irish towns. The particular case quoted (Mayo) is certainly, on a first view, paradoxical. It is a "typical congested county," and yet its phthisis death-rate (1900-02) was only 1·64 per 1,000. We have to remember, however, that Mayo is a county from which emigrants to America have been very largely drawn in recent decades; and, further, it supplied between the years 1894 and 1903, 20,000 migratory labourers annually out of a total population of approximately 200,000, for the harvesting in England and Scotland. These labourers leave Ireland from the middle of February onwards, "many not returning until a week or two before Christmas" (Board of Trade Report on "Migratory Labourers"). Unless suitable correction can be made for the great disturbances of the figures which must result from such a wholly abnormal condition of affairs as this, no great importance can be attached to the Mayo phthisis death-rate.

Those who do not agree that, on the whole, it has been the fit who have emigrated, and who therefore hold that no appeal can be made to

Diagram shewing the population of Ireland (all person, males, and females) at several age periods in the census years from 1841 to 1901.

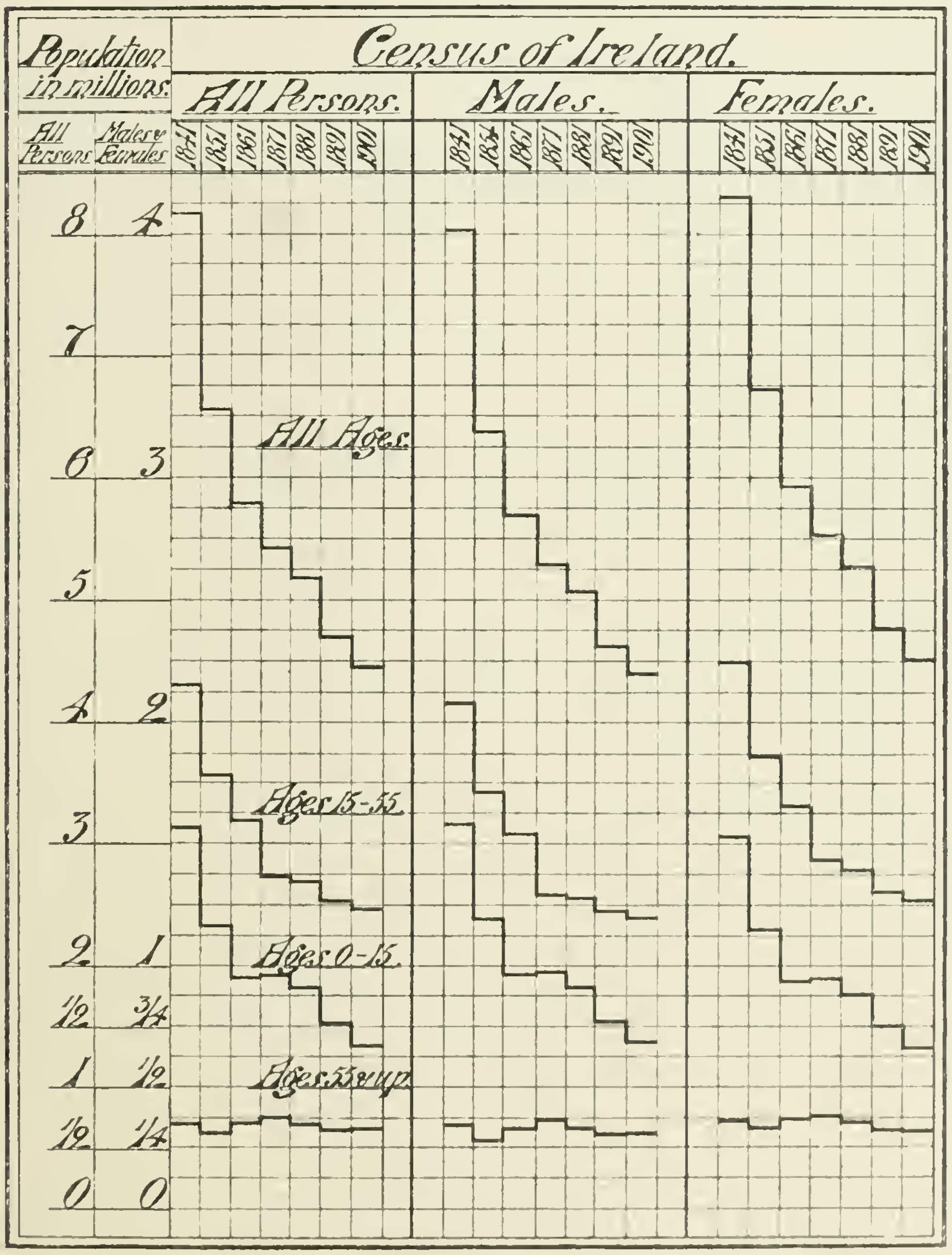


DIAGRAM X.

reduction of disease-resisting capacity, have still to deal with the influence exerted by emigration upon the age-distribution of the residual Irish population. "Emigration," says Dr. Newsholme (p. 212), "has altered the age- and sex-distribution of the population by removing a large part of the young and middle-aged, among whom most deaths from phthisis occur; and when the figures are corrected for age- and sex-distribution, the true increase of phthisis, on the assumption of constant age- and sex-distribution, is seen to be really larger than the figures show." There is room for much misunderstanding here, for it is necessary to distinguish between correcting for the Irish age- and sex-distribution at a later by comparing it with that at an earlier period, and making correction by comparing the Irish distribution with that of some other country. Presumably the last-named comparison is in question at the bottom of p. 212, and the former at the top of p. 213. Moreover, readers of the sentence at the top of p. 213 may be misled, as there is apparently some misquotation here. The phthisis death-rate in 1891 is given as 19·3, as compared with 21·5 in 1901. The former rate should be 21·34. But the important point is that this rate is not lowered but raised by correction to 22·13, and it then, therefore, exceeds the rate for 1901 (21·42).

The facts as to varying age-distribution at successive census enumerations are illustrated in the accompanying diagram (X). In immediate succession to the exodus following upon the famine, the proportion of population at the phthisis ages (15 to 55) may be assumed, following Dr. Newsholme, to have declined; but during the last forty years, in which we have, in fact, to deal broadly with a declining amount of emigration the percentage has risen. Instead, therefore, of abnormal age- and sex-distribution tending to diminish the phthisis death-rate, it has in recent decades had the contrary effect. The proportion of persons aged 15 to 55 to total population has actually increased, during the last forty years, from about 50 to about 54 per cent.—an increase which nearly corresponds with the recorded increase in the phthisis death-rate. The diagram shows, in the case of both males and females, a falling off in the numbers at ages 15 to 55 to an extent corresponding with the fall at all ages up to 1871, but since then the numbers at ages 15 to 55 show less marked falling off. It will be remembered that the recorded increase in phthisis occurred in the seventies and eighties.

If the population for 1901-10 be taken as the standard, and its death-rates applied to the other populations, the following results are obtained:—

IRELAND.—PHTHISIS.

Decennium	Standard death-rate	Factor for age and sex correction
1841-1850	19·63	1·02955
1851-1860	19·83	1·01916
1861-1870	19·48	1·03747
1871-1880	19·04	1·06145
1881-1890	19·31	1·04661
1891-1900	19·92	1·01456
1901-1910	20·21	1·00000

Applying the factors to the recorded decennial rates we have the following average annual death-rates per 10,000 :—

IRELAND.—PHTHISIS.

Decennium	Average annual death-rate	Factor	Death-rate per 10,000
1871-1880	19·5	1·06145	20·70
1881-1890	20·9	1·04661	21·87
1891-1900	21·3	1·01456	21·61
1901-1910	20·21	1·00000	20·21

Thus phthisis in Ireland, judged by a *corrected rate*, has actually declined in the last thirty years.

In summary it may be stated, therefore, that Ireland, instead of showing the marked decline observed in England and Wales and Scotland, shows a slight rise which commenced with the institution of compulsory death registration; and this has been followed in the last thirty years by a decline; again, upon the whole, the phthisis death-rate for the last fifty years has been practically stationary. The explanation of this behaviour is to be sought partly in the fact that the deaths for the earlier decades in Ireland are underestimated, and partly in the disturbance introduced by migration—this latter including over and above alterations of age constitution, a lowering of the disease-resisting power of the residual population, and an increase due to the addition of a certain number of deaths of returned emigrants.

The case of Ireland has been investigated at length because of the light it throws on emigration generally. Turning now to take a more extended view, it is in the first instance important to bear in mind the fact that in dealing with phthisis-rates consideration is, perforce, always limited to areas of death registration, for there are no reliable figures relating to the outlying regions to which emigrants from civilized countries have resorted.

Speaking of the United States of America as a whole, Hirsch said, thirty years ago, phthisis "has increased in a marked degree of late years in many parts." He also referred to increase of phthisis in

Australia, and stated that, in Melbourne, the death-rate rose (1865-69) from 2·22 to 2·52; he quoted, moreover, the works of Thomson and Reeve, which illustrate the apprehension felt on this subject in Australia in the seventies; and he cited the paper[1] in which Hall states that, during five years' practice at Hobart, there were 235 deaths from phthisis, only 37 of whom had been born in the Colony, all the rest being immigrants from Europe.

A few of the recent reports of medical officers of health give more detailed information. Thus Dr. A. J. Anderson finds that nearly one-third of the deaths among Europeans dying in Cape Town occurred among persons who had been less than four years in the City (14 out of 60 had lived in Cape Town less than one year). Again, Dr. Porter gives a table (p. 26, Report of 1912) relating to 208 British-born immigrants in Johannesburg, dying between July 1, 1907, and June 30, 1911. He finds that 79 of these "were infected before arrival in South Africa." Judging by these figures it would appear that in the whole of South Africa there must be several hundreds of deaths annually of persons who have left the British Isles only a few years previously.

I am indebted to Mr. Robert Cross, Actuary of the Atlas Company, for some particulars which he has obtained for me from Mr. Crum, Assistant Statistician of the Prudential Society of America. Mr. Crum writes, "Very few of our cities report the deaths by nativity and specific cause of death. In New York City, out of 1,548 cases of tuberculosis treated, 711, or 45·9 per cent., were natives born, and 837, or 54·1 per cent., were foreign born. As regards migration of consumptives from one State to another, we may say certain Western States, such as Colorado, Nevada, Idaho, Utah, and certain southern and south-western States, such as North Carolina, Arizona, New Mexico, and Texas, have been for many years objective points for consumptive health-seekers. Colorado, particularly, has secured the larger share of such patients." Mr. Crum adds, "With the exception of Colorado, the States mentioned as being objective points for consumptive patients do not have a thoroughly well organized registration system, and their mortality returns are not complete or reliable, and in fact most of the States do not issue any State Health Reports." He further quotes statements as follows: . . . "Salt River Valley of Arizona, with a winter population of 15,000; 33 per cent. were health-seekers, of whom fully four-fifths were incurable." . . . "The death-rate from tuberculosis in North

---

[1] *Trans. Epid. Soc. Lond.* (1862-63), 1867, ii, p. 85.

Carolina during 1910 was 271·6 per 100,000 of total population." . . . "In the City of Denver during the period 1893-98, 84·1 per cent. of the deaths from tuberculosis were of non-residents as against 15·9 of residents. For the years 1905-09 the average number of reported cases among non-residents was 87 per cent. of the total."

Unfortunately, whatever may be said as to the imperfection of the United States vital statistics applies with even greater force to the earlier statistics of Australia, New Zealand, Canada, and South Africa; while it is practically impossible to trace deaths occurring in such places as Egypt, Madeira, or the Islands of the Pacific. Our own death records must be depleted of many thousands of entries annually if there be added to the total number of deaths of invalids, at the various health resorts outside this country, all the deaths from phthisis, of natives of the British Isles, occurring in Canada, Australasia, South Africa, India, &c., &c., or on the sea itself. Practically all these deaths, had it not been for development of the use of health resorts and of modern facilities of travel, and for the great growth of emigration, would have been registered in this country.

We cannot fail to note, moreover, that the period of declension of phthisis in civilized lands corresponds with that of increase of facilities of travel. This subject is perhaps deserving of further examination. Thomas Young, in the second book of his "Historical Treatise on Consumptive Diseases," has given a full account of the growth of opinion with regard to change of air; an account, which he tells us, we owe to his having had access to the Library of the Medical and Chirurgical Society. From the earliest times the value of sea voyages was recognized, for example, by Aretæus and Caelius Aurelianus. Then there is the well-known aphorism of Celsus, "the worst air for any disease is that in which it has originated." Celsus held that a long voyage was advisable, "if the strength allowed it, and Alexandria was generally to be preferred; though a shorter voyage might be tried if the strength was much reduced; or the motion of a coach or chair."

Pliny recommended "pine woods, a voyage to Egypt, or a course of milk in the mountains." The advantages of sea voyages have been fully examined in an essay by Dr. Gilchrist. This writer attributed considerable benefit to the action of vomiting, which he said "improves the tone of the stomach and bowels and is a powerful deobstruent"; and it was, perhaps, with some such idea as this in his mind that Sydenham advised horse exercise. It is true he recommended *long journeys*, but they were to be "on horseback, the patient was to take care to have his linen well aired, and to continue his journey long enough, the longer as he is the more advanced in life." Carriage exercise was "not by any means to be despised, though not equal to riding." Morton relied upon "the chalybeate waters, as those of Islington." Mead advocated "a change of climate, a voyage to Lisbon or to Naples, riding or carriage exercise." Thomas Young refers to some curious recommendations—e.g., that of Clapier, "living some time in a coal-mine," or that of Read, "residence in a cow-house." Erasmus Darwin advocated the production of nausea, not, as recommended by some, by sea voyages or swinging, but by "the rotatory motion of a chair properly suspended by a rope and turned thirty or forty times round." Fothergill puts in the forefront "Bristol water,"[1] adding that "the journey and the cool morning air may co-operate with its virtues." For the winter, he says, "We may choose Camberwell, Peckham, the lower parts of Clapham, the drier parts of Lambeth, Battersea, Fulham, Chelsea, Brompton, or Kensington, and more elevated situations, such as Buxton and Matlock, for the summer." He also mentions the South of Europe and Madeira. Rush, in 1793, recommended a voyage across the Atlantic; and Thomas Young himself (writing in 1815) advised, in addition to the South of England (Devon or Cornwall), the South of Europe (Lisbon, Montpelier and Italy), the islands of the Mediterranean, Madeira, or even the West Indies.

It will be seen how, up to this point, the sufferer from phthisis was only exceptionally sent far away from home: but during the course of the nineteenth century there came the great increase in the facilities of travel, and the sea voyage, instead of being only to Naples or Alexandria, was now to the other side of the world—e.g., to Australia or the Pacific. There was, moreover, notable development, particularly in the latter part of the century, of the belief in pine woods and the air of high altitudes, and the patient was advised to go to far-distant mountain districts and high tablelands. The individual sufferer who was sent for a sea voyage in the times of Celsus or Pliny was, doubtless, as subject to risk of dying away from home as he who was sent the far longer distances of recent years; but the visit to Alexandria must have been quite an exceptional event, whereas thousands of phthisical people have been sent to the remote parts of the earth in the last half-century.

---

[1] Thomas Young notes the high mortality from consumption in Bristol, "and yet," he says, "as if in defiance of experience, this very place has been chosen as the great resort of consumptive persons." In his own case he adds, "the symptoms originated in a very pure air in a very healthy part of Hertfordshire, and subsided principally during a residence of some months in Red Lion Square, surrounded by closely built streets."

In summary of the available statistical evidence for the past fifty years, it may be stated that, between 1861 and 1911, the number of deaths from phthisis annually in England and Wales has declined from some 50,000 to less than 40,000, the death-rate having diminished from about 25 to 11 per 1,000. There can be no question that altered nomenclature is responsible for a considerable portion of this decline, indeed, we should probably not be far from the mark in assuming that the yearly number of deaths from pulmonary tuberculosis has remained, throughout the fifty years, very nearly stationary. During this time the population has rather more than doubled, and if all those becoming phthisical had stayed at home and died in England and Wales, and if no real "declension of phthisis" had occurred, the total number of deaths recorded annually would now, other things remaining equal, be rather more than 70,000 instead of less than 40,000. A considerable but unknown number of thousands of deaths, however, occurring each year abroad, should be added to the 40,000 deaths. Another way of putting the case would be to say that if, in addition to making allowance for altered nomenclature, account be taken of the influence exerted by migration, it becomes necessary to realize that a presumption is raised that quite a considerable percentage of the apparent decline in the phthisis death-rate will, then, have been sufficiently accounted for.

Migration, then, not only throws much light upon the problems presented in the Sussex villages, but also upon similar difficulties encountered in dealing with Irish statistics; and, further, it must be held responsible for some considerable share in causing the decline in the phthisis death-rate of England and Wales. But a hypothesis must stand or fall, not by its explaining the phenomena it was invented to explain, but by its power of elucidating other phenomena. The following considerations present themselves, on a first survey of the situation, as deserving of notice in this connexion:—

(1) An assumption that countries in which material prosperity is rapidly increasing tend to throw off, by emigration, the less resistant portions of the population; while countries in which, for one or other reason, there is unrest, and almost stationary or even declining prosperity, tend to throw off the more resistant portions of the population—would go far towards explaining the dissimilarities in the recorded phthisis death-rates of the various civilized countries in the last half-century.

(2) The remarkable tendency for the age-periods showing highest incidence of phthisis in England and Wales to shift in the direction of the higher ages during the last three or four decades[1] is a fact which has been found difficult of explanation. The attempt has been made to show that altered nomenclature, or, again, that variation in degree of resistance in the population, may have played a part here; but a simple solution of the difficulty is forthcoming if it be assumed that migration has been operative.[2]

(3) While there has been improvement in the general death-rates at most age-periods, there has been a decided tendency for those at the later periods to show increase. The explanations which have been suggested do not, perhaps, cover the entire ground. The Registrar-General, in his Annual Report for 1909, attributed the higher rates at older ages to the lessening amount of over-statement of the ages of old people nowadays, as compared with years gone by. Sir Shirley Murphy has referred to this question (loc. cit.), and to variations in death-rates at the several age-periods generally. Such variations may, as Sir Shirley suggests, be due to altered environment. It is noteworthy, however, that "for adolescents and young adults up to the age of 25, the eighties were the period of greatest decline" (Registrar-General's Annual Report, 1909), and the writers of the Census Report refer to the "exceptional volume of emigration during the decennium" (1881-90). It appears, therefore, that emigration may have played some part in determining the alteration under consideration. As regards increase at later ages, there needs further to be borne in mind the question of the return of emigrants to their own country.

(4) A further point to be noted is the occurrence of low general death-rates and low phthisis death-rates in rapidly growing and prosperous towns. Correction for age-distribution does not wholly explain the phenomenon, and there can be no doubt that the quality of the migrating population plays an important part here. Possibly, however, the influence of changed environment under new conditions of life may also have to be taken into account.

---

[1] *See* Tatham's table, p. xciv, Supplement to Sixty-Fifth Annual Report of Registrar-General (England and Wales) (1902), 1901.

[2] In Ireland, as already noted, the age- (and sex-) incidence of phthisis differs markedly from that of England and Wales. It tends to follow that of the Sussex villages in the fifties: thus there are the higher rates at the migrating ages and among women. The differing character of the emigration in England and Wales and in Ireland must have considerable influence in bringing about this varying incidence upon age and sex.

(5) Dr. Bulstrode, when he prepared the charts in his Sanatorium Report, left room for the death-rates of succeeding years to be filled in, and he was wont to say that, as time went on, the decline would give place to a more or less dead level, or even to a rise. Professor Pearson has recently insisted upon the fact that there is now observable a slackening in the rate of fall in the phthisis death-rate of this country. It has been suggested that this phenomenon can be reconciled with increasing use of sanatoria, if it be assumed that the growth of institutional treatment, in combination perhaps with other influences, is leading to lessening resort of patients to other lands in search of health.

On the whole, then, it must be concluded that but little is accurately known as to variations in the real death-rate from the disease now called phthisis in this country. Sydenham speaks in the letter to Cole of phthisis "killing two-thirds of those who die of chronic affections." Thomas Young says it is "so frequent as to carry off prematurely about one-fourth of the inhabitants of Europe." W. Heberden believed that the disease increased notably during the eighteenth century. Nowadays it is generally supposed to be declining. There is really, however, no evidence upon which to base a precise statement; but while this is so, it by no means follows, as might perhaps be assumed, that the environmental improvements of the last fifty years have been without influence. Medical officers of health have always held that there are two chief ways in which phthisis death-rates are influenced by environment. Better food and better housing undoubtedly go with low phthisis-rates. On the other hand, the tendency of urbanization is to act in the opposite direction. It may be that loss and gain largely counterbalance one another, and that close correlation between certain environmental influences and phthisis death-rates will not, therefore, be found. Even if this be admitted, it by no means follows that heredity and direct case-to-case infection are the only things worth consideration. Professor Pearson, two years ago, was only prepared to say, "I will not dogmatically assert that environment matters not at all"; but he has now come to recognize that considerable importance must be attached to it, indeed, "Environment" finds a place upon one of his latest title-pages. In view of this fact, and of his discovery of the existence of a Public Health "literature," further development of his views may be predicted in the near future.

Meanwhile, the main conclusion emerging as the result of all recent epidemiological work is that "the prevention of consumption involves something more than the mere circumvention of a bacillus." It is interesting to recall Leichtenstern's comments, made in 1883: "For all Koch's brilliant discovery, there are still many lacunæ and open questions facing us in the ætiology of consumption; and these offer to the practitioner, to the statistician, to the pathologist who studies the history and geography, to the pathologist who experiments, and to the bacteriologist, a wide field wherein to co-operate. It is not by the power of any sudden enthusiasm treating the infective nature of phthisis as if it were already made perfectly clear, that the new doctrine will be made secure of its position, but by earnest work and prolonged study." Hirsch quotes this, and adds the remark, "I should even go further and maintain that these gaps in our knowledge are much greater than seems to be commonly supposed, and that, until they be filled up, we cannot promise to ourselves any answer to the question how important the tubercle bacillus may be for the origin of consumption."

Epidemiological Section.

November 22, 1912.

Dr. W. H. Hamer, President of the Section, in the Chair.

The Influence of Parental and Grandparental Age at Birth of Offspring on their Susceptibility to the Zymotic Diseases.

By R. J. Ewart, M.D.

Within the last few years much attention has been directed towards the second generation with a view to the discovery of laws which modify the type of offspring produced. Amongst other factors, age of parent at birth and birth sequence have received some attention, and several observers have dealt with this subject, amongst whom may be mentioned Henry Ancell and Matthews Duncan as far back as the seventies; of more recent observers are M. de Köröse, Directeur de Statistique, Budapest, who has shown that a pertinent relation exists between age of parent at birth of offspring and the subsequent type of the child; Mr. Havelock Ellis who, in his work on "British Genius" shows that those born about the twenty-fifth year and also late in life seem to be blessed in this way; and Dr. Marro, who at the International Congress on Eugenics last August demonstrated an even closer relation when dealing with intellect. Dr. Buchan and I have shown also that birth sequence and infantile mortality are closely associated. M. Lucien March has corroborated this fact and has discussed the possibility of parental age at birth being the determining factor. Basing his arguments on the peculiarities of the first birth, he concludes that the increase of mortality is due to sequence, and not to the increased age of the parent. We can, however, question this deduction, though the reason why need not be set out here. The general conclusion that both birth sequence and age of parent at birth are factors in modifying both the type and subsequent development of the child seems to be highly probable.

The influence of birth sequence I have dealt with previously,[1] and on the present occasion I intend to consider the transmissible effect of time only, that is, influence of age of parent at birth on offspring. Perhaps it would be helpful to others if I mention the precautions that must be taken, if fallacy is to be avoided.

First.—The basis on which material is selected must be uniform, that is, offspring born in a particular year only should be considered.

Second.—The character under consideration must be compared with the parent when he or she was of the same age. Thus, a child of 13 years, who is in Standard VII, is compared with that which the father and mother reached at a corresponding age. In dealing with stature, &c., this cannot be done, and the present height of parent must be taken, though allowance should be made for any alteration in the physique that occurs after the fortieth year, otherwise the comparison will not be on a uniform basis. Both parents should be seen, but often this is hardly possible. Still, owing to the correlation between mates, significant results can be obtained if one only is considered, which is usually the mother. The way in which the data are handled is of little moment in comparison with the method adopted in collecting them. Professor Pearson's correlation factors can be used, but I have contented myself with means and percentages which, though not measuring differences accurately, form a good indication of the direction of the bias.

Third.—At least two age-periods should be taken, so that some idea as to the effect of death amongst the parents may be formed. Thus, mothers of children who are 14, and were born after the fortieth year, will be now over 55. If, however, the child is now 5, the corresponding mother will be 46; and as more deaths will have occurred amongst the former than the latter, some estimate must be made as to the nature of the type that has disappeared.

Fourth.—As far as possible different races should not be included, unless proof is forthcoming that their reproductive habits are the same. In my own work in Middlesbrough I have dealt with an essentially mixed race, which has come from all quarters of the country.

Fifth.—Three generations should be considered, but, practically, except in rare instances, this is impossible, and we seldom find reliable records of grandparents amongst the class with which I have dealt. Still, where such can be obtained, they should be noted.

Sixth.—It is advisable in work of this kind that forms should not be used. The observer should actually see his rough material, and all questions relative to ages should be made directly. This criterion was strictly adhered to in the present work.

---

[1] *Eugenics Review*, October, 1911.

Lastly.—The number should be sufficiently large to ensure that the chance of a significant sequence is strongly in our favour.

That one birth of itself influences the next we can dismiss, though as regards sex there is some evidence that such a connexion exists. For example, M. March states that sequence—namely, girl following girl and boy following boy—is found to occur about fifty-four times out of a hundred couples, but if sex is to some extent dependent on age, as there seems reason to believe, this hypothesis may not be necessary to explain the fact; indeed, the suggestion would be that the present birth is not influenced by substances arising from the previous embryo, though I should admit that this is contrary to a view I formerly held. That interval is a factor in producing a modification of development is beyond question, and we know that the time necessary to recover completely from the effects of the birth varies according to the age of the mother. As the influence of birth sequence when analysed seems eventually to form a factor of age of parent, our problem is in either case to consider the influence of parental age on offspring, taking into consideration the length of time between the births. In dealing with the influence of age of grandparent through the parent on the offspring the problem becomes more simple, as these variations tend to approximate a constant mean, and under such conditions we find the character under consideration following a constant curve. It is impossible to examine fully the whole biological aspect of this question, and in the present instance only a few examples can be given, as our main object is to apply this law to epidemic diseases.

The only character apart from immunity that I will refer to here is stature, though it must be understood that it is taken as an example only from other investigations, which include eye colour, death, fertility, and ability. The first table, compiled from my observations at Middlesbrough, illustrates the influence of sequence.

TABLE I.—SEQUENCE OF BIRTH, STATURE, AND INTELLECTUAL STANDARD AT THE END OF SIXTH YEAR.

	Number	Mean height	Percentage able to read
First-born	225	41·4	33·0
Second	186	41·3	33·5
Third	140	40·7	34·0
Fourth	100	40·2	28·0
Fifth ...	89	39·9	25·0
Sixth and over	203	39 7	24·0

That the foregoing sequence is dependent on both interval and age is shown by the following:—

TABLE II.—INTERVAL AND SEQUENCE OF BIRTH, AND PHYSICAL DEVELOPMENT OF CHILD IN SIXTH YEAR.

		Age of parent at birth of child			
		20 to 30		30 to 40	
	Interval	Number	Mean stature	Number	Mean stature
First, second, and third child	2 years	177	41·99	45	41·19
Fourth, fifth, and sixth child	1½ ,,	78	39·94	49	40·84

However, if first births only are taken, the stature at the sixth year increases as the mother gets older, though, if the ratio between mother and child is considered, it seems to follow a curve coincident with age at birth—that is to say, this variation depends on type.

The following table gives the mean differences between height of mother and offspring according to age of parent at birth of child (born in 1901, measured in 1910).

TABLE III.

Age of mother at birth of child	Number	Mean difference between mother and child in tenth year	Correction necessary for age of mother	
20 and under	39	12·90 in.	—	12·90
21 to 25	193	12·25 ,,	—	12·25
26 to 30	216	12·18 ,,	—	12·18
31 to 35	167	12·47 ,,	0·15	12·62
36 to 40	108	12·50 ,,	0·29	12·79
41 and over	34	11·95 ,,	1·09	13·01

If we now consider the age of the grandparent at birth of parent on the difference between mother and child of stated age (tenth year), we get the following:—

TABLE IV.

Age of grandmother at birth of mother	Number	Difference between mother and child in tenth year
20 and under	111	12·17
21 to 25	190	12·20
26 to 30	206	11·95
31 to 35	150	12·12
36 to 40	87	12·59
41 and over	18	13·08

Before we draw any inferences from these tables, it would be as well to examine closely exactly what has been done. In Table III the disturbing factors of heredity and type of mother have been to some extent removed by comparing offspring and parent, and as regards the characters under consideration, all are constant, with the corrections for acquired variation, except age at birth amongst mothers, and stature amongst the offspring. Now in Table IV we have considered the grand-parental age at birth of parent on the difference between sire and offspring. It must be remembered, however, that the child is now apparently constant and the parent variable, and by a comparison, the variation arising from type is removed. Hence we would seem to be estimating the effect of age of grandparent at birth on characteristics of the sire, not the offspring. This is not absolutely true, as will be seen later in dealing with fertility. If we now compare the sequences, we find that the influence of age of grandparent at birth on parent corresponds to the influence of parent on offspring, so that we can not only assume that such a connexion exists, but that the character thus acquired is transmissible from one generation to the next.

If, on the other hand, we had selected only maturity births of maturity births, that is, offspring born between the twenty-fifth and thirtieth year of parents who were themselves produced at a corresponding age, we should find a rise in stature of approximately $\frac{1}{4}$ in. per generation. The reason why giants do not arise more frequently amongst us is easily explained, but to do so would lead me too far from the present theme. From these tables we can assume that time affects the offspring through the parent much in the same way as it does ourselves—that is, both directly and indirectly. By directly I mean that we grow old no matter what happens, and by indirectly that the influence may be accelerated by what is known as a bad environment. So it would seem that the ova themselves vary in type according to the age of mother, the best being produced at maturity, that is, about the twenty-seventh year, and their subsequent development may be modified by birth interval, which, as the parent gets older, should be longer, if the proper nutritive processes are to be brought into play. This may be described, biologically, as the influence of time prior to fertilization, and after or during the natal period. Perhaps the strongest piece of evidence in favour of this view is found in the way we select a mate, for it appears that through selective mating qualities dependent on age at birth are subconsciously recognized.

A little study of this table will show that selection appears to follow a law—namely, a man is selecting a woman born of parents of the same age or older than himself. If this factor were not recognized the sequences, reduced to a basis of 100 in the columns when read from left to right, should be approximately equal, which they are far from being. Should the male be born in the fortieth year of his parents, or over, he is unlikely to find a mate corresponding in regard to parental age, so he selects from the opposite extreme. It may be noted in passing that by inquiry it was found that the grandparents were not known to each other previous to the introduction of husband and wife in 75 per cent. of the cases. Hence the influences of family friendships may be ignored. The inference is that since we subconsciously recognize age of parent at birth through the force of selective mating, peculiarities dependent on such must exist.

TABLE V. HUMAN MATING (GOOD ARTISAN CLASS).
(Only those who reproduced in 1901 are considered.)

Age of grandfather at birth of wife	Age of grandfather at birth of husband									
	Under 25		21 to 30		26 to 35		31 to 40		36 and over	
	Number	Per 100	Number	Per 100	Number	Per 100	Number	Per 100	Number	Per 100
Under 25 ..	30	12	51	11	41	10	37	11	53	19
21 to 30 ..	57	24	103	23	92	22	70	21	67	20
26 to 35 ..	66	28	133	29	129	29	74	23	43	16
31 to 40 ..	50	21	98	22	97	23	73	22	50	19
36 and over	32	13	59	11	66	15	73	22	61	23
	235		444		425		327		274	

My conclusion is, that the type of offspring varies according to age of parent at birth, and that such is transmissible to the next generation, but beyond this there are also variations dependent on duration of birth interval and incomplete recovery arising from the exhausting influence of previous births, which, in so far as they are acquired in the sense that Weismann uses the word, are not transmissible. If this is true, as I believe it to be, it is a most far-reaching discovery, though in the present instance I only propose to deal with its bearing on immunity.

In dealing with the part of our subject that particularly interests this Section of the Society—namely, infectious disease—the assumption was made that the factor of hereditary immunity was small in comparison to the risks of infection, and data were collected on that basis. Unfortunately, such is not the case, and it would seem that even the susceptibility to scarlet fever can be regarded as of equal, if not greater, import than chance of infection. The following observation bears this out: Taking the percentage of mothers who have had scarlet fever as 20, and the number of children between the ages of 6 and 13 as 12 per cent., the question arises, how often should we meet a mother and child, both of whom have had this complaint, at an interval of at least twenty years? The answer may be stated as follows:—

TABLE VI.

Chance.

Mothers	Children: Had scarlet fever	Children: Have not had scarlet fever	
Had scarlet fever	2·4	17·6	20
Have not had scarlet fever	9·6	70·4	80
	12	88	100

If we now select couples at random from the population, the following distribution is obtained in a group of 600, which, reduced to a basis of 100, reads as follows:—

Actual.

Mothers	Children: Had scarlet fever	Children: Have not had scarlet fever		*Transfer*	
Had scarlet fever	5·1	14·9	20	+2·7	−3·3
Have not had scarlet fever	6·9	73·1	80	−3·3	+2·7
	12	88	100		

Thus the actual number of mothers and children, both having had scarlet fever, was 5·1, the number expected being 2·7—about half as many. Hence a significant susceptibility to this complaint must exist if the facts here dealt with are representative. It is therefore advisable, in considering the influence of the age of parent at birth on immunity of offspring, that the two should be compared so as to remove the factor of heredity. Both parents should be considered, but, as has been already indicated, owing to the selective nature of mating, significant results can be obtained when one only is dealt with. In most of my data, however, bearing on immunity the type of parent from which the child sprang has not been considered, and we have seen, in dealing with other characters, that such corrections make our sequence more regular and the curves steeper, we may therefore assume that they probably indicate an actual bias. There are, moreover, many practical difficulties in obtaining trustworthy histories relative to such diseases as measles, whooping-cough, small-pox, &c., so that we are compelled to rely on the direct method of correlating the character with age of parent at birth, irrespective of type. Material can be selected in two ways: either by direct inquiry of the parent, or through the returns made by general practitioners under the Notification of Infectious Diseases Act. The former was used in cases of the minor ailments and the latter with respect to diphtheria and scarlet and enteric fevers. As the first method simply concerns percentages, it needs no further explanation, but in the latter an attempt has been made actually to calculate attack-rates.

TABLE VII.—INCIDENCE OF MEASLES AND OTHER DISEASES ON CHILDREN IN THE FIRST SEVEN YEARS OF LIFE (BORN IN 1903), ACCORDING TO THE AGE OF THE MOTHER AT BIRTH (GOOD ARTISAN CLASS).

Age of mother at birth of child	Number of inquiries	Number of illnesses per child	Number attacked with measles per 100	Number attacked with whooping-cough per 100	Number attacked with chicken-pox per 100
20 and under	21	2·05	97	63	35
21 to 25	143	2·25	89	59	45
26 to 30	182	2·1	88	54	41
31 to 35	92	2·1	82	48	38
36 to 40	54	1·9	82	40	25
41 and over	41	1·7	80	43	44

The column "Illnesses per child" included pneumonia, vague febrile attacks, and other ill-defined conditions. To ensure the accuracy of the information, only a good citizen class was dealt with, and the inquiry was first made in 1909, when the children were over 6 years of age, and again in 1911, when they had reached the eighth year. Any discrepancy in the replies as regards age and sickness were inquired into, and if verification was not forthcoming they were ignored.

A procedure of this kind is necessary when information is procured second-hand. As to whether the children really had the ailments attributed to them is, of course, open to question; but such an error is again assumed to be equally distributed, and hence neutralizes itself in comparison with a similar series of data.

Further details were obtained with reference to the incidence of these diseases on first children and those born at under or over a two-yearly interval. The differences noted were small, and did not indicate any particular susceptibility of either class.

Before considering the major infectious ailments, some further explanation is necessary as to the nature of the material and the way it was handled. In the population (Middlesbrough) under consideration there were in the years 1905-10 a mean of 2,557 boys and girls living in any one year between the second and fifth; of these 638 were born between the twenty-first and twenty-fifth years of the mother.

Now in the seven years 1904-10 there were 548 cases of scarlet fever amongst the children of 2 to 5 years, and of these 166 were born between the twenty-first and twenty-fifth year of the mother, which gives an average incidence for one year of 23·86 cases. Since this figure includes ages from 2 to 5 years, the mean for one of these years is 5·9: therefore in this particular group 5·9 children were attacked out of a possible 638, giving a rate of 9·29 per 1,000. A good many cases of infectious disease escape detection; still, on the assumption that such an error is distributed fairly evenly over all the classes given, it should not vitiate the accuracy of the trend of the incidences. The results are easily followed in the following tables, and it is interesting to note that generally the same curves are observed as were found in reference to stature.

The incidence of scarlet fever practically follows the same law as given for the minor ailments. The conclusions to be drawn from the figures are curious, and somewhat contrary to what would have been expected. The infectious diseases appear to fall heaviest on those children born between the twenty-third and twenty-eighth year of the mother, and as regards the father the period seems to be about five years later. The latter figures are not given, as they simply reflect the mother's influence—if the table is moved on for the period given. The contention that this incidence may be due to the selective death-rate in the first and second year, which we know falls heavily on those born at the extremes of the reproductive life—that is, those who die at these times from other causes would ultimately be stricken with these complaints—can hardly be maintained, as we see that with scarlet fever the same incidence is observed in the one-year period, though hardly so pronounced. Still, the number of cases at this early age is small, and hence too much reliance must not be placed on them. It would seem that when growth is fastest the susceptibility to infectious disease is greatest, provided that immunity has not been acquired previous to that time.

In diphtheria, for the first year the curve is inverted, but as soon as independent life is established—that is, the end of the first year—it is the same as with scarlet fever, and again towards the end of the growing period the tendency to inversion appears. Enteric and other febrile disturbances agree in the main; and here a fifth period is added, that under one being left out. It shows in a very marked manner the tendency already mentioned for the period of greatest susceptibility to change from the middle to those born at the extremes of life, as soon as the rate

TABLE VIII.—SHOWING INCIDENCE OF SCARLET FEVER ACCORDING TO AGE OF MOTHER AT BIRTH OF CHILD (3,027 CASES BETWEEN YEARS 1904 AND 1910).

Age of mother at birth of child	Number of children 1 year old and under			Mean number living in the 2nd, 3rd, 4th or 5th years			Mean number living in the 6th, 7th, 8th, 9th or 10th years			Mean number living in the 11th, 12th, 13th, or 14th years		
	2,939			2.557			2,311			2,194		
	Number of boys and girls living	Mean number attacked in one year	Number attacked per 1,000	Number of boys and girls living	Mean number attacked in one year	Number attacked per 1,000	Number of boys and girls living	Mean number attacked in one year	Number attacked per 1,000	Number of boys and girls living	Mean number attacked in one year	Number attacked per 1,000
20 and under	220	0·14	0·64	181	0·55	3·04	150	1·43	9·53	123	0·86	5·5
21 to 25	764	0 57	0·74	638	5 9	9·25	566	7·86	13·88	566	2·54	4·48
26 to 30	870	1·00	1·15	789	6·54	8·29	730	7·93	10·86	671	2·58	3·84
31 to 35 ...	635	0 43	0·68	573	3 28	5·72	511	4·23	8·28	478	2·46	5·17
36 to 40 ...	332	0·28	0 84	271	2·00	7·38	261	2·03	7·77	286	0·72	2·52
Over 40	117	0·14	1·1	105	0·54	5·14	93	1·00	10·75	70	0·35	5·00

DIPHTHERIA. ANALYSIS OF 660 CASES. DETAILS SAME AS ABOVE (1901-1910).

Age of mother at birth of child	One year and under		2nd, 3rd, 4th or 5th years		6th, 7th, 8th, 9th, or 10th years		11th, 12th, 13th, or 14th years	
	Mean number attacked in one year	Number attacked per 1,000	Mean number attacked in one year	Number attacked per 1,000	Mean number attacked in one year	Number attacked per 1,000	Mean number attacked in one year	Number attacked per 1,000
20 and under ...	0·29	1·32	0·64	3·54	0·34	2·27	0·18	1·46
21 to 25 ...	0·43	0·56	2·75	4·31	2·43	4·29	0·57	1·01
26 to 30 ...	0·57	0 65	3·39	4·30	2·57	3·52	0·97	1·45
31 to 35 ...	0·43	0·67	2·04	3·56	1·66	3·25	0·57	1·19
36 to 40 ...	0·14	0 42	1·14	4·21	0·80	3·06	0·36	1·26
41 and over ...	0·14	1 20	0·39	3·71	0 28	3·01	0·11	1·57

ENTERIC AND OTHER FEVERS. ANALYSIS OF 230 CASES, YEARS 1904-1910. DETAILS AS ABOVE

Age of mother at birth of child	2nd, 3rd, 4th or 5th year		6th, 7th, 8th, 9th or 10th years		11th, 12th, 13th or 14th years		15th, 16th, 17th, 18th, 19th or 20th years	
	Mean number attacked in one year	Number attacked per 1,000	Mean number attacked in one year	Number attacked per 1,000	Mean number attacked in one year	Number attacked per 1,000	Mean number attacked in one year	Number attacked per 1,000
20 and under ..	0·04	0·17	0·14	0·77	0 11	0·73	0·48	3·90
21 to 25 ...	0 32	0·42	0·74	1·16	0·40	0·81	0·54	0·95
26 to 30 ...	0·68	0 78	0·77	0·98	0·46	0·63	0·40	0·60
31 to 35 ..	0·11	0·17	0·29	0·50	0·27	0·53	0·40	0·84
36 to 40 ..	0·14	0·42	0·14	0·52	0·07	1·27	0·26	0·91
41 and over ...	0·11	0·94	0 11	1·05	0·14	1·51	0 26	3·71

of growth has ceased. The following table relative to the incidence of death from diphtheria is of interest in so far as it suggests that attack-rates and the mortality coincide.

TABLE VII.—AGES 2 TO 10. 1904-1910. MIDDLESBROUGH.

Age of mother at birth of child	Number attacked	Number of deaths	Rate per 1,000 attacked
20 and under	17	2	118
21 to 25	104	22	211
26 to 30	121	26	205
31 to 35	84	16	181
36 to 40	39	10	271
Over 40	11	2	191
	376	78	

If we consider the type of parent from which the child came, the corrected incidences for scarlet fever are :—

TABLE VIII.

Age of mother at birth of child	Number of children attacked	Number of mothers who had also been attacked when young	Number per 1,000 in which child only has been attacked
20 and under	10	6	40
21 to 25	68	16	77
26 to 30	70	18	75
31 to 35	40	14	65
36 to 40	30	14	52
41 and over	8	4	50

The numbers are few, but they show what has already been stated, namely, that the age influence is more easily studied when the hereditary factor is partially or completely removed.

The following tables deal with grandparental age :—

TABLE IX.—SCARLET FEVER AND GRANDPARENTAL AGE.

Age of grandmother at birth of mother	Number of children attacked with scarlet fever	Number where mother also had been attacked when young		Percentage of children only attacked per 100 cases
20 and under	15	5	50	66
21 to 25	66	15		47
26 to 30	68	17		75
31 to 35	40	14		65
36 to 40	32	13	62	55
41 and over	16	5		69

The sequences in the percentages show that the susceptibility of the mother depends on the age of the grandmother at her birth, and also that the same curves are observed when the third generation is considered, thus giving a further suggestion that the immunity or susceptibility depending on age at birth is a transmissible character.

We may now pass to consider the influence of grandparental age on the susceptibility to the minor ailments, no allowance being practical for peculiarities dependent on type or hereditary characteristics.

TABLE X.

Age of grandfather at birth of father	Number of inquiries	Number of minor ailments per child in first ten years
20 and under	11	2·36
21 to 25	47	2·34
26 to 30	73	2·35
31 to 35	50	2·26
36 to 40	45	2·02
41 and over	29	2·28

Age of grandmother at birth of mother	Number of inquiries	Number of minor ailments per child in first ten years
20 and under	23	2·78
21 to 25	59	2·5
26 to 30	62	2·45
31 to 35	58	2·33
36 to 40	35	2·2
41 and over	22	2·5

One point which is not directly connected with our subject deserves some attention, as it has a bearing on the argument—namely, size of family, as influenced by age of grandparent at birth of parent.

TABLE XI.

Age of grandfather at birth of father	Mean size of family born		
	Good artisan	Mixed	Slum
20 and under	5·2	6·2	6·9
21 to 25	4·4	5·9	5·6
26 to 30	3·8	5·4	6·2
31 to 35	3·9	5·5	6·6
36 to 40	4·0	5·7	7·0
41 and over	4·6	5·0	7·3

Number of families investigated, 612.

Two diseases necessitate special consideration—namely, small-pox and tuberculosis. The majority of the data obtained were abstracted in the case of small-pox from the records in London and Leicester, which were placed at my disposal, and in the case of tuberculosis from the Meathop Sanatorium. Perhaps it might be of use if I take 410 cases, as given in the *Sanitary Record*.[1] They read as follows:—

---

[1] Pearson, *San. Rec.*, September, 1912.

TABLE XII.

Mother's age at birth of unit	Phthisical population per 1,000		Per 1,000 general population (adult)
	Crude	Corrected	
20 and under	56	55	51
21 to 25	224	222	256
26 to 30	308	300	312
31 to 35	211	213	220
36 to 40	158	160	131
41 and over	43	50	30

The corrected column is added, and is an attempt to account for an error which Professor Pearson overlooked—namely, that consumptives come of a stock which has a life expectancy below the average, hence the births that should occur in later years are missed. It is hardly necessary, perhaps, to exemplify this point, as a history of tuberculosis considerably lowers the value of a life for insurance purposes. Elaborate tables will be found bearing on the age-incidences of general death and that arising from phthisis in the Registrar-General's Returns. We must also remember that the death of one mate in most cases prevents further reproduction in the other, so the effect is greater than at first appears. In the corrections appended to Professor Pearson's figures I have assumed that close on half of the persons at present affected with this complaint come of a phthisical stock. It is, however, advisable that all these disturbing factors should be avoided by altering the basis of selection so as to produce uniformity in the first instance. It makes the collection of data more difficult, no doubt, but less juggling with the ultimate results is necessary. In a series of 179 cases where as far as possible biological homogeneiety was aimed at with reference to mean age, sex distribution, social grade, &c., the following sequences were obtained. (Tuberculosis occurring in units previous to the fifteenth year is excluded.)

TABLE XIII.

Age of mother at birth	Phthisical population per 100	Normal population per 100	Difference
20 and under	8	6	+ 2
21 to 25	22	26	− 4
26 to 30	22	30	− 8
31 to 35	26	22	+ 4
36 to 40	14	13	+ 1
41 and over	8	3	+ 5

The numbers are small, but, along with Professor Pearson's corrected figures, I think the evidence is sufficient to suggest that this complaint is met with rather more frequently at the beginning, and with increasing incidence on those born at the end of reproductive life. It is to be borne in mind that phthisis claims its victims in adult life, mean age being about 28 years.

Now, when we turn to small-pox, we find a different state of affairs. In close on 400 cases of small-pox, the mean age of the patients being 11 years, the following distribution for age at birth was found:—

TABLE XIV.

Age of mother at birth of the unit	Small-pox population per 100	Normal population of corresponding mean age per 100	Difference
20 and under	4	8	− 4
21 to 25	26	25	+ 1
26 to 30	32	30	+ 2
31 to 35	25	22	+ 3
36 to 40	11	11	− 0
41 and over	2	4	− 2

TABLE XV.

Age of father at birth of unit	Small-pox population per 100	Normal population of corresponding mean age per 100	Difference
20 and under	2	3	− 1
21 to 25	21	19	+ 2
26 to 30	30	27	+ 3
31 to 35	28	24	+ 4
36 to 40	12	15	− 3
41 and over	7	12	− 5

Comparing a small-pox population and a phthisical one through the medium of corresponding population of similar mean age, we get:—

TABLE XVI.

Age of mother at birth of offspring	Difference for phthisical population	Difference for small-pox population	Gross difference in favour of small-pox
20 and under	+ 2	− 4	− 6
21 to 25	− 4	+ 1	+ 5
26 to 30	− 8	+ 2	+ 10
31 to 35	+ 4	+ 3	− 1
36 to 40	+ 1	− 0	− 1
41 and over	+ 5	− 2	− 7

That is to say, out of 100 units born, seventy might be attacked with both diseases, fifteen by small-pox only, fifteen by tubercle only. A certain number would, of course, escape both.

This method of demonstrating that the types of people attacked by these two diseases are different must, at the best, be approximate only, for if this influence of time plays such an important part in our life, it is obvious that age at birth is only a rough way of estimating it, as we know that many who are 35 years old correspond to others who have only lived for 25 years or even less. As has been shown, this influence is transmitted in varying degree, according to the generation dealt with, so that to get an accurate idea of how a particular unit stands with reference to what I term "the force of duration" we must not only consider age of parents at birth of unit, but each grandparent, and so on. I hardly think that there is any factor peculiar to the parasite which accounts for the way in which these diseases distribute themselves, and I am inclined to the view that the incidences would be identical were the mean age of attack similar, and no difference would be found if the mean age of death from tuberculosis were between the second and twelfth years. "We might postulate this as a rule, that the kind of person killed by a specific disease varies according to its age-incidence." It is hardly necessary for me to suggest what must happen to a population if all those units which should be killed by small-pox are allowed to live and reproduce, or to suggest that the whole of the decline of the death-rate from phthisis is due to this cause. It is worthy of note that the fall seems to have been dependent on something that happened about the beginning of last century before any alteration occurred in the sanitary administration of the country. And, further, the nature of the curve and its duration seem to lend support to this idea, for we see that it seems to follow fairly closely the thoroughness of vaccination, if an interval of twenty-five years is allowed to clapse—that is, sufficient time for the unit that has been saved to reach the middle of reproductive life. Corroborative evidence seems to be forthcoming from the decline of the birth-rate, for it has been shown that the maturity birth has a small family.

I sincerely hope, even though these findings rather tell against the possibility of the scheme at present being introduced into this country, that further investigations, on account of their biological interest, will be undertaken by the central authorities, for they alone are able to do such a work on a sufficiently large scale. France has already dipped into the subject, so surely we will not be left behind.

DISCUSSION.

Mr. MAJOR GREENWOOD said he rose with some embarrassment because he was sure the Section had been much impressed by the enthusiasm which had inspired Dr. Ewart's paper, and the immense amount of labour which must have been devoted to the compilation of the statistics, and such criticism as he could offer might appear ungracious. He, personally, had found it rather difficult to follow the author on to those higher planes which were, perhaps, more familiar to members of the Aristotelian Society than to this Section, but before the meeting could discuss the ultimate causation of any facts it would be well to be certain that they were facts. Dr. Ewart remarked that the way in which the data were treated was of little moment in comparison with the method of collecting them. If the meaning of that were that it was futile to spend much time over the analysis of data which were fundamentally vicious, everyone would agree with him. But if Dr. Ewart meant that the methods of treatment, given the data were good, was a matter of pure indifference, one could only regret that Laplace and other great analysts had wasted so much time in evolving methods for the treatment of statistical data. One could get material in which the differences were so immense relatively to the magnitude of the characters compared, that one did not need any elaborate investigation before reaching a conclusion. If one took 300 or 400 people all aged 30, and compared the mean stature of that sample with the mean stature of 300 or 400 children aged 6, the differences between the means and the ratio of such difference to the absolute sizes was so large that it would be absurd to talk much about the effects of errors of random sampling. But if one took 300 persons aged 25, and 300 others at 24½, then the question whether the difference observed was significant could not be answered on inspection. All the tables in the present paper corresponded more nearly to the second of these cases. Table I, he concluded, was intended to show there was a difference between the mean height of the first-born and the mean height of the second-born, third-born, &c. On the face of the figures the differences were not very large; and as to whether they were or were not simply the effect of random sampling—i.e., whether, supposing the mean stature was the same in all such groups, one might not observe differences of these orders simply as the result of operations of chance—could only be determined by an investigation based on a knowledge of the variability of stature. But that investigation had not been made, and no materials supplied in the paper allowed such test to be used. But, taking the last column of the same table, that relating to the percentage able to read—a character which, for the immediate purpose, could be taken as either present or absent—one could roughly test the figures and see whether, given the number of cases there provided, the variations over the series were significant. For instance, the worst deviation would be in the last group, and so far as he could judge by rough analysis, it would arise as an error of sampling once in thirteen or fourteen times, whereas it had here occurred once in six times. In other words, there was a deviation from the expected result, but no cautious person would base an argument on such a difference.

Passing to the tables of infectious diseases, which more especially affected this Section, the question was whether in Table VIII the deviations, which were very irregular, were or were not effects of random sampling. Such a question required delicate inquiry, because even if one might say that the chance of a person getting scarlet fever at a certain age was fairly well measured by the number of cases which occurred at that age divided by the number of persons at risk, the fluctuations about that mean value would not be given by the ordinary standard deviation of random sampling, because the events were not independent. In the case of tossing coins, one toss did not influence the result of the other tosses. But scarlet fever was an infectious disease, and the occurrence of one case of it affected the likelihood of other cases occurring; so that the fluctuations about the expected value would be very much more considerable than they would be about the mean in the case of the percentage able to read. No trace of such an investigation was presented in this paper. On turning to the table on which Dr. Ewart laid special stress, that relating to mating, the method revealed was even less adequate. In order to prove the point sought to be made there, a simple investigation was sufficient. Supposing 1 per cent. of grandparents (or parents) of all marriageable men were between 21 and 30 at the time of the birth of their children, and 2 per cent. of the grandparents (or parents) of all marriageable women were between those ages, then if the age of the husband's parent were independent of the age of the wife's parent, the chance of the concurrence of the husband having a parent of that age with a wife having a parent of that age would be $\frac{1}{100} \times \frac{2}{200}$. And if one had N couples, the number of such concurrences would be $N \times \frac{1}{100} \times \frac{2}{200}$. Then the expected number of cases on this chance hypothesis could be compared with the actual number, and the general nature of the agreement determined by considering the value of all the differences, taking every possible concurrence, or some function of such value. But the table in the paper was not prepared in a way permitting the application of that test, because the different classes overlapped. The first vertical section comprised parents between 21 and 25, and the limits of the next were 21 to 30; so some of the cases in the first column were also included in the second, and the conclusion drawn from a comparison of the percentages read from left to right might be misleading. No conclusion ought to be drawn from such a table, the entries in which were not independent. The foregoing were criticisms of method, but, even assuming that all the differences noted were significant in the sense of not being attributable to the ordinary effects of random sampling, did the conclusions which members were invited to draw follow from them? In the first table he understood that the mean height at a certain age of the first-born children was based on a sample of 225, which had been measured. Obviously they had not got here a case in which there were 225 families each of which contained six children, so that the author could compare the stature of the first-borns with the sixth-borns from the same families, because the numbers in the first column were not all the same: therefore, presumably, they were drawn to some extent from different families. He invited the meeting to note the possibly enormous significance of that. It was well known that fertility varied with social status: the average middle-class family was smaller than the working-class family, and the tendency was for the family to diminish in size as one passed up the social ladder. The result must be that as one passed from the "population" of first-borns to the "population" of sixth-borns one found a smaller and smaller percentage of the offspring of economically superior families. Consequently, if there was any tendency for the average stature of people in different strata to vary, the observed variations here might, for all that could be said to the contrary, be due to that. In Germany there was, he believed, evidence that the mean stature of the *Einjahrige* in the army was greater than the mean stature of ordinary recruits at the same age; and he thought there was also evidence that the mean stature of the children in better-class schools was greater than the mean stature of children (at the same ages) in schools of poor neighbourhoods. Therefore it was difficult to see how evidence could be provided that in any given sample there was not, on the average, a difference of class between first and later born children.

To sum up he might say that: (1) No explanation was provided by Dr. Ewart to answer the preliminary question whether, assuming the data to be homogeneous, these differences were more than the effects of chance. And (2) even if the results were valid from that point of view, it seemed clear that the data were ambiguous, and the conclusion which could be drawn from them could not, in any scientific sense, be called a law. No doubt these criticisms might be met, but if statistics were to be regarded as a science at all, it was incumbent upon any worker who presented a statistical paper either to adopt approved methods of testing his figures—such as were to be found in all elementary text-books—or to give in the paper some adequate explanation as to why they need not be applied.

Dr. SHRUBSALL asked whether, in studying eye colours, the author took only children of parents whose eye colours were known. Blue-eyed children were not likely to arise from the brown-eyed parents. With regard to the table of personal age and eye colour, he asked whether that was based on a study of the age changes of individual cases, or whether it simply represented the proportions of eye colours of children in Middlesbrough schools or Middlesbrough families at any given date. He also asked what means of measuring differences of eye colour were adopted, as it was a simple matter to make such measurements by means of the tintometer, and scarcely occupied longer than merely looking at the eyes.

Dr. EWART, in reply, admitted that he had not worked out the probable error in his cases, though this ought to be done. Unfortunately, mathematics was not yet a part of the medical curriculum. His method had been to collect a series of data, a number approaching a thousand. He worked out his results, put the matter on one side, then repeated the process again on a second series of observations. If the results of the two tallied, he deemed them worthy of consideration. The mating tables he regarded as significant. He had compiled the figures of 2,000 matings, and so far as he could judge, the conclusions he had based on them were true. He had also taken a number of cases where the law had and had not been obeyed. There were 15 per cent. in favour of the bias he had given, and he regarded the numbers as outside the range of random sampling. The eye colour statements were simply colour differences: he had abandoned the idea of saying what absolute colour an eye was, there were so many shades. In his series he called them either the *same*, *plus*, or *minus*, according to the position of the colours in the spectrum, any change towards the red end being plus and the blue end minus when compared with the parent.

Some Recent Theories of Tuberculosis and their possible Significance.

By F. G. Crookshank, M.D.

If I say that in this paper, which has been somewhat hurriedly written, at the courteous demand of your Secretaries, there is little of my own, save the thread which strings together the pearls or beads of others, I hope it will not be thought that I am anxious to evade criticism. Yet there is one criticism that I fain would forestall—that these notions are "purely speculative." Such criticism, although apparently conclusive to some, is generally irrelevant, and often, as when we are concerned, not with rash hypothesis, but with interpretation of observed facts, quite inaccurate. And there is no supposition, to my mind, more extravagant than that which suggests that we are in possession of all the facts bearing on the problems of tuberculosis, and that our official doctrines are in all respects adequate as explanations of those facts which we possess. Moreover, it is well to remember that, as Darwin said, without hypothesis there is no useful observation. Unfortunately, of late a vicious habit has prevailed. Clinical and statistical observations that are not easily reconciled with fashionable teachings are allowed to recede into the shade; and those who would drag them from their limbo are, not uncommonly, hailed as fanciful or romantic. We should avoid the habit of deprecating hypotheses, or interpretations of facts, that are awkward to those with settled convictions or who have formulated plans of action on imperfect information. You, Sir, have shown us a more excellent way: and perhaps I am not wrong in suspecting that almost the chief lesson you desired to convey to us in your recent and illuminating address is that, whilst clinical and pathological observations are only partially elucidated, there is danger lest procedures which may appear to be justifiable or even necessary in the interests of the State, prove to be Dead Sea apples: dust and ashes in the mouth, and not the succulent and sapid drupes that we have fondly hoped. At any rate, you have reminded us that the prevention of consumption involves something more than the circumvention of a bacillus: and may I recall your citation, from Leichtenstern and Hirsch, to the effect that there are still many lacunæ in our knowledge of consumption?

Certainly, I suppose no one will deny that, until our knowledge is complete, attempts on the part of the State to grapple with the disease must be either empirical or unsuccessful. Possibly empirical action is sometimes more beneficent than that which is founded on incomplete knowledge or interpretation. Where are now the anti-spitting enthusiasts of ten years ago, who vowed they would abolish the "great white plague" by by-laws and municipal spittoons?

But while we in this country, putting the whole of the observations of our predecessors as to scrofula behind us, have been busy with public discussions directed towards one end, the abolition of phthisis, abroad much work has been done which cannot fail, I think, in time to widen enormously our conception of what tuberculosis really is, and what relation it bears to phthisis. The work of Poncet, of Lyons, ably seconded as it has been by his devoted coadjutor Leriche, and a band of enthusiastic disciples, has attracted little attention in Great Britain. In America it has excited ingravescent interest; and, on the Continent, many who scoffed at first now remain, if not to pray, at any rate to declare that they "knew it all along" to be correct. This work of Poncet's, though in aim clinical, has the deepest interest for the epidemiologist; for if rightly understood, it balances and completes that of von Behring, of Calmette, and of many others. I will ask you, therefore, to bear with me patiently if, in order to put Poncet's views, as I understand them, fairly before you it is necessary to revert for a few moments to what may seem very elementary matters.

In one of our leading text-books tuberculosis is defined as the formation, in one or more organs, of certain bodies, called tubercles, that are the result of infection with a specific organism—the *Bacillus tuberculosis*. In another text-book, of equal reputation, tuberculosis is defined simply as an infectious disease produced by the *Bacillus tuberculosis*. Now, since the bacillus received its name because it was shown to be the microbial agent in the production of tubercles, the former definition is, in strictness, the more correct. But, may the tubercle bacillus be the cause, or one of the causes, of lesions and processes that are not characterized by the presence of tubercles? If so, and if these lesions and processes are to be reckoned a part of tuberculosis, the second definition is in greater accordance with the observed facts. Yet, for an Englishman to apply the term "tuberculosis" to lesions and processes in which there are no tubercles is illogical. The French, however, may do so; for to them tuberculosis is a process due to Koch's bacillus, and they speak not of tubercles but of follicles. So that by the happy term of "tuberculose non-folliculaire" they can indicate a process due to Koch's bacillus and yet without the anatomical signature of tubercles. For the sake of clearness then, may I adopt the wider definition, and the convention of speaking of lesions, in which there are no tubercles but are yet due to Koch's bacillus, as tubercular; and of alluding to those lesions, in which there are tubercles, as tuberculous?

If we now suppose syphilis to be only known to us primarily as a process of "gummatosis," a disease characterized by the presence of gummata; with the advance of pathological information we should have to take into consideration the early syphilides, which we would soon see have a fairly obvious clinical or historical relation to gummata. We should also have to consider the relation between the gummatous affection and those manifestations that we now call parasyphilitic. Doubters would say, that so far from these "parasyphilitic" processes being most obvious in those who show marked signs of gummatosis, the contrary is indeed the case; and clinical instances would be triumphantly adduced of persons with "parasyphilitic" affections in whom, on examination, no evidence or history of any gummy process could be obtained. Now Poncet and his followers, in respect of tuberculosis, hold views which may be said to correspond roughly with those we all hold in respect of syphilis—that is to say, that there are lesions and processes from which the anatomical signature of the specific granuloma is lacking, and of which some are "banal" inflammatory reactions, due to the operation, probably, of attenuated poison. The cautious views of those who go so far with Poncet as to recognize what they call "tuberculose non-folliculaire"—that is to say, lesions in which the tubercle bacillus but not tubercles may be found—are on a parity with those people who admit the clinical and pathological relationship between the secondary syphilides and gummata, but who may deny the syphilitic nature of what we call parasyphilides. For the lesions of what Poncet and Leriche call "tuberculose inflammatoire" are lesions in which there is neither tubercle nor bacillus, and which yet are believed to be due to the operation of an attenuated poison.

It would not be necessary to say that this analogy between syphilis and tuberculosis, or rather between some of the views held in respect of these diseases, is put forward purely as illustrative, if Hamburger had not, in the *Zeitschrift fur Schulgesundheitspflege* (1912, No. 2) pushed the analogy a little far. I use it entirely "without prejudice," as lawyers say.

Now for many years the dermatologists have been accustomed to point out that, though tubercle bacilli may be found in the tissues affected by lupus vulgaris, in lupus erythematosus it is not so, notwithstanding that it is in the latter rather than in the former affection that clinical investigation reveals a history of familial or of personal infection. Yet their observations have been unheeded by all save a few physicians. It now seems passing strange that, when we first became impressed by the notion that tuberculosis is a frequent, nay a usual, infection of urban children, and that those phthisical in later life represent only a fraction of those who become tuberculous when young, we did not inquire if it were likely that bacilli should remain "latent," and yet not give rise to clinical manifestations, by virtue of their toxins, in distant parts of the body.

The fact is, we were under the thrall of Virchow: humoralism had gone out with the Franco-German War, and no one dared suggest the "tubercular" nature of any process in which there were no tubercles, and perhaps no tubercle bacilli. Certainly, after a time the tubercular nature of many pleurisies was acknowledged; but there was much skating over very thin ice, and to-day there are many British physicians who will not go very far, even in company with Landouzy. The dermatologists, and some oculists, however, refused to surrender their positions; and Sir Dyce Duckworth alone amongst physicians dared to say a word in favour of scrofula, or the tubercular diathesis. So while the dermatologists and oculists maintained the "tubercular," or, if you will, the diathetic nature of certain disorders, on grounds which are at least as strong as those on which tabes is now recognized as syphilitic, the physicians remained under the spell of the unitarian conception of tuberculosis. It is true that, here and there, some light broke through the obscurities: Landouzy, Hutinel, Schmaus, Pitres and Vaillard did good work, but, as Poncet puts it, there was one formula, exacting and exclusive, "Toute tuberculose est folliculaire et tout follicule est tuberculeux." The doctrine of specific forms reigned unchallenged. "Every notion or observation was ignored that did not tally with the formula of the day."

The first great advance towards the recognition of the fact that the non-specific lesions and processes occurring during the course of tuberculosis—the simple serous effusions, the simple inflammations of the various mucous membranes, and so forth—are indeed tubercular, and not merely intercurrent affections, was made fifteen years ago when Poncet demonstrated on clinical grounds the tubercular nature of many cases of arthritis. He showed that, quite apart from the destructive, caseating, tuberculous joint affections, in which both tubercles and bacilli may be found, there are also dry, plastic, ankylosing, or "serous rheumatisms" that may not be bacillary, that are probably toxic, but that indubitably occur in those the subjects of attenuated infection by the tubercle bacillus. He supported his contention by reasoning as convincing as that employed by dermatologists to prove the tubercular nature not only of lupus erythematosus, but of many cases of erythema nodosum.[1]

We now recognize, then, a tubercular "rheumatism" which may precede, or be coincident with, or may even be independent of, the classical, bacillary "tuberculous" arthritis of the surgical wards. It was the study of this tubercular "rheumatism" which led Poncet and Leriche to examine what they called "ab-articular tubercular rheumatism," and then to merge their ideas in the great conception of the tubercular inflammations: of "inflammatory tuberculosis." This, though first put forward in 1902, has only been formally defined in their volume published this year. Now, tubercular inflammation (or inflammatory tuberculosis) is that form or manifestation of tuberculosis in which the attenuated poison produces, in the tissues and organs, only ordinary inflammatory reactions. It is, then, non-specific in the sense of being without "signature"; there are no tubercles and no giant cells. Nor do we know tubercle bacilli to be present in the lesions themselves any more than, so far as we know, spirochætes are to be found in the posterior columns of a tabetic cord. But, under the most varied clinical disguises, and in the most unexpected manner, "inflammatory tuberculosis" may attack every tissue and every organ. There are many clearly defined types of disease, especially the chronic "cirrhoses," such as chronic indurative mediastinitis, whose ultimate pathology remains in suspense. Poncet claims to hold the key; for he says, very often it can be shown that the chronic process has shown itself, either in connexion with an early tuberculous infection, or in succession to one; and the clinical coincidence of these "banal" processes with known tuberculous infection is held to be so frequent that even the positive result of diagnostic tests, and the beneficent effect of specific treatment, are not necessary as justifications for belief in the existence of a causative correlation.

---

[1] Allbutt and Rolleston's "System of Medicine," 1911, ix. p. 467.

This is not to say that always is every commonplace inflammation or fibrous induration due to the effects of the attenuated poison of the tubercle bacillus, snugly ensconced in some out of the way mesenteric or bronchial gland. Very often a duplex causation is at work. Thus is the mystery of the pneumonokonioses revealed to us as by a flash. It is at least probable that we are now within measurable distance of understanding the confused pathology of hepatic cirrhosis. There is not time to dwell on the clinical puzzles that seem about to be solved; yet there are forms not only of eye and skin disease but of endocarditis, of neuritis, of serous effusion, and of plastic inflammation, that will occur to everyone as hitherto unexplained; and, most important, there is to be borne in mind the influence of the attenuated poison of the bacilli upon the whole series of ductless glands that determine the growth and development of the child. Possibly here is the explanation of the occurrence of the types of scrofula which, after all, represent morphological varieties of the species as plainly as do the cretins, the mongoloids, and some subjects of dyspituitarism.

The truth is that, as Poncet says, there is in tuberculosis a scale of virulence and a scale of specificity. Lessened virulence implies lesions without specific characters; and the indifferent reaction of the tissues to minimal dosage may be traced in every organ of the body. If miliary tuberculosis be due to intense and unresisted infection, we have, with lesser virulence and greater resistance, the ordinary "medical" cases of tuberculosis. Lower in the scale are those we call surgical: still greater attenuation and more active resistance gives us the minor surgical cases, and scrofula. Below these, again, in the scale of degradation come the bastard dermatological tuberculides, and, at the bottom, the tubercular inflammations, without any specific lesions, and a feeble and furtive existence of the bacillus here or there. Poncet's "septicæmic tuberculosis" and Landouzy's "typho-bacillosis" are at the other end of the scale, albeit not necessarily fatal.

I do not know that Poncet himself has hinted it, but it seems quite likely that if Much's work on the tubercle bacillus is to be recognized, as from a recent paper in *La Riforma Medica*[1] seems now must be the case, we shall soon be enabled to prove the tubercular nature of many of these "non-specific" inflammations by demonstration of Much's granular bodies in the tissues. The point must be borne in mind, for doubtless there are lacunæ in Poncet's pathology, though the force of his clinical insight strikes one afresh every day. It was not, however, till I had read Poncet's book that I appreciated fully a brief paper, by McConkey, that appeared in the *Medical Record* of New York on October 28, 1911. Now McConkey, in discussing the question, "Why is the apex the point of election in pulmonary tuberculosis?" asks why, since tuberculosis of the lymphatic system is so common in childhood, is apical phthisis so usually deferred till after puberty? (The phthisis of childhood, wherein the lung is invaded by direct extension from caseous bronchial glands is, for the moment, irrelevant.) He finds his answer in the laws of parasitism, and defines tuberculosis as a parasitic disease, affecting the lymphatic and serous systems of children. He suggests that normal lung infection is deferred until after puberty, for not till then does the host become an actual or potential parent, and it is to the interest of the parasite to leave the body of its host in such a manner that, in the way of domestic intimacies, its species may be continued by entry into the body of another host—a child. Incidentally, too, Louis's law is recalled, and it is shown that all widely prevalent infectious diseases, save those contracted through sexual communion, are diseases of childhood. So that, so far from the tuberculosis of childhood requiring some special explanation, it would be odd indeed if tuberculosis were not essentially a disease of early life.

---

[1] Costantini, G., "Il valore del metodo di Much per la coloragione dei bacilli tubercolari," *Riforma Medica*, Napoli, 1912, xxviii, pp. 1121-28.

We then arrive at this extension of von Behring's work, that the tubercle bacillus is, normally, a parasite of the lymphatic and serous systems of children. Phthisis is the escape or extrusion of the parasitic bacillus in the interests of its own species. Some such extrusion or means of escape is common, of course, to all parasites. What follows? During the truly parasitic life of the bacillus, poisons are secreted—though McConkey does not say this—which affect the life of the host to some extent; which produce some at least of the conditions that Poncet describes; which are responsible for the production of "scrofula," and whose effects represent the "chantage" the host pays the blackmailer that he cannot completely eliminate through the normal channels for the elimination of microbic parasites—the bile and intestines. If there be not a certain amount of resistance on the part of the host to the parasite there is either a general invasion of the whole system, with the production of a "bacillosis," or an acute miliary tuberculosis: or else direct extensions through the peritoneum, or lungs, from caseous glands.

Now these views of McConkey, or rather these suggestions of his which I have somewhat freely interpreted, should be connoted with a paper by Calmette, which is translated, inadequately I fear, in the

Universal Medical Record for April, 1912, and to which some allusion was made in the *Proceedings* of this Section last March.[1] Calmette, as we all know, does not recognize any natural immunity of the human species in respect of the tubercle bacillus. Whether or no he believes in degrees of susceptibility is another question. All he admits is opportunity, or its lack, for infection; and he maintains that every town-bred child, or nearly every town-bred child, does become infected early in life. If the infection be not too massive, and if reinfections be not toc frequently repeated and, as some would say, if the child be not too susceptible (in which case miliary disease supervenes), a degree of immunity is produced which he regards as *tolerance* of the bacillus. Here, then, is Calmette's apparent paradox: immunity from *tuberculosis* —orthodox tuberculosis, not Poncet's—is a matter of tolerance of the bacillus—the parasite.

It is obvious that Calmette recognizes, just as do Poncet and McConkey, a stage of true parasitism extending from early childhood till later, during which there is "immunity" from specific disease, but not, in Poncet's view, from such non-specific manifestations as may be considered to be the levy paid by the host for its immunity from catastrophe. Now Calmette insists, as do many others who have made experiments, that the natural avenue for the elimination of vanquished or dying bacilli is through the bile into the intestines. He regards caseation and suppuration as efforts of the system to eliminate and destroy Koch's bacilli when the ordinary processes of phagocytosis, encapsulation, and elimination through the bile fail to cope with the massive or repeated infections to which some bearers of quiet "parasitic" tubercle bacilli are subjected. He does not, like McConkey, regard excavating phthisis as due to the arrival of that phase in the life-history of the parasite when another host is required, but looks upon the softening of tubercles as a last resort of the patient to expel the pests which are infesting him. He insists on the importance of "reinfections," and speaks of the consumptive patient dying by reason of the very force of his own efforts. In much the same way Boeri, in a recent issue of the *Gazzetta Medica Lombardia*, in speaking of fever, alludes to Victor Hugo's description in "Les Travailleurs de la Mer" of his hero's forces as sustained by fever's fatal aid—"La fièvre le soutienne, un secours qui tue." "Immunity," then, is "tolerance"; phthisis is "intolerance" of the parasite. Gouget, in *La Presse*

---

[1] *Proceedings*, 1912, v, p. 166.

Médicale for October 26, 1912,[1] points out that the work of Raubitschek and others forces us to the conclusion that, in the case of the exotic flora of the intestine, those alone are really immune from the *disease* who are "tolerant" carriers of the *microbes*. Immunity from disease does *not* imply freedom from the bacillus, but toleration of it. As I ventured to say in the course of some "speculative" remarks made in the course of debate before this Section last March, so too with syphilis; persons who are "cured" are no longer immune, and those who are immune are not really "cured." Calmette's practical suggestion is that, since we cannot hope to destroy the natural sources of the bacillus, or, during urban life, to escape infection, the logical course would be to establish a *modus vivendi* between our children and the parasite by "vaccinating" the former with judicious doses of attenuated organisms, administered *per os* during the early years of life.

At any rate, it seems that we must, more decidedly than of late years, draw a very clear distinction between phthisis and "tuberculosis." This also is implied, if not definitely expressed, throughout the whole of that series of papers by Robin[2] which have lately appeared in the *Bulletin général de Thérapeutique*; for Robin lays stress on the importance of treating the "soil" of phthisis. He does not mean by this mere dosing of the patient who has developed phthisis. By "soil" he means the whole or sum of the physical states on which phthisis may become engrafted. Now, while he seems to recognize individual susceptibility to the growth or invasion of the bacillus in a way that Calmette does not he says that the stigmata of the "soil" for phthisis are practically indistinguishable from those of latent tubercular infections. So that when we see a child who exhibits the physical characteristics of one or other of those two types of "scrofula" described by the elder physicians, it is hard to say whether we are observing a morphological variation of the human species that is particularly "susceptible" or that has feeble powers of resistance to the parasite; or whether we have to do with an expression of the effects on the growing infant of an early lymphatic or serous infection of moderate severity. Poncet would say that the latter is the case. In other words, the "terrain" for phthisis is "parasitic" infection, in McConkey's sense, of the lymphatic system by the

---

[1] *Presse Méd.*, Paris, 1912, xxxii, p. 877.

[2] *Bull. gén. de Thérap.*, Par., 1911, clxii, p. 561 *et seq.* 1912; 1912, clxiii, pp. 193 *et seq.*

Bacillus tuberculosis; and scrofula represents a form of very early and more or less resisted infection. We have also to deal with that factor of the "threshold" which is so important. Until the threshold is crossed, infection is tolerated and secures us immunity from overt disease. If the threshold be crossed, we have either, in early life, generalized tuberculosis, or, in later life, phthisis, in its acuter forms. One point more: Calmette says that since on the post-mortem table so many persons exhibit traces of "tuberculization," all men are "tuberculizable." Robin has it that since in so many cases the evidence of such "tuberculization" is trifling, all men are not *equally* tuberculizable. But the difference between them is a mere logomachy.

In this very brief résumé the necessity for compression has led me to do inadequate justice to the authors from whom I have borrowed, and I have, of malice aforethought, omitted all reference to that question of the differences between human and bovine bacilli and infections which cuts across all others. Yet, perhaps enough has been said to warrant me in asking your brief attention to what is really a working model of the tuberculization of communities as well as of individuals. Thirteen years ago I had the opportunity of making some study of the conditions under which phthisis obtains as a cause of death in asylums for the insane. The paper, which has been recently republished in a volume of "Essays," may be found in the *Journal of Mental Science*[1] for 1899. At that time it was admitted that proof had been given that phthisis, as a cause of death, prevailed in asylums to an extent unrealized previously; and, at first, my further contention that the asylums were responsible for the phthisis was also accepted. But, after a while, some of those who had originally been in agreement were led to accept the notion that since careful post-mortem examination usually showed in the case of those dying of phthisis in asylums some focus of tuberculous disease obviously antecedent to the date of admission, the asylum environment, using the term in its widest sense, should no longer be held responsible for the event. Those who are interested will find abundant controversial material in the *Journal of Mental Science*[2] and *British Medical Journal* for 1900 and following years; and in Dr. Mott's reports from Claybury. You will remember, too, that Dr. Newsholme, in his admirable treatise, accepted Dr. Mott's point of view, and so far from indicting the asylums, as I had done, exonerated

[1] *Journ. Ment. Sci.*, 1899, xlv, pp. 657-79.

[2] *Journ. Ment. Sci.*, 1900, xlvi, pp. 1-30.

them: indeed, he proceeded to suggest that they fulfilled a useful purpose by way of segregating persons who were dangerous *qua* Koch's bacillus. But it was never shown that *phthisis* obtained, on admission, in more than a few of the persons who died subsequently of that disease. The whirligig of time brings its little revenges. Few to-day would dispute that the "old lesions" found in those dying of phthisis in asylums are other than such as most of us Cockneys carry with us to our graves. And, though no doubt the majority of town-dwellers admitted to asylums are the subjects of "latent" tuberculosis, the responsibility for their *phthisis* lies, if not on the opportunity, as Calmette would say, for massive and repeated infections afforded them, at any rate upon the overcrowding, deficient dietary, and lack of fresh air that still obtain, though perhaps less than formerly, in even the best of these institutions.

In the case of great London asylums, such as Claybury, obviously almost every person admitted is already "tuberculized," in Calmette's sense. In provincial institutions, however, persons who are not already "tuberculized" are admitted from the fields and from the hills. These persons succumb rapidly, as Calmette has shown; and, as I ventured to say in 1899, it is small wonder that a man taken from the plough to the day-room of an overcrowded asylum should die miserably of phthisis in a year or two. I venture to think that this question of phthisis in asylums is worthy of more serious attention from epidemiologists than has yet been afforded it, for, as I have already said, it gives us a working model, on not too small a scale, of processes affecting the community at large.

It is clear, however, that not only the question of bovine *versus* human infection, but that of the reinfection in later life of those "tuberculized" in childhood needs investigation. To what extent is the overcoming, by the bacillus, of the lymphatic and pleural resistances a question of reinforcement of the invaders, or one of flagging of the defence? Time may tell us. But, again, we must draw a clear distinction between tuberculosis—inflammatory, follicular, latent, or occult—and phthisis. What we are now learning of "tuberculosis" teaches us that between it and "phthisis" there is really a great gulf fixed, which nevertheless, under certain conditions, may be only too easily bridged. So long, however, as we persist in speaking of phthisis as chronic pulmonary tuberculosis, so long will the real issues be obscured. For, if we confuse the distinction, we fall into the danger of assuming that all those who die of the rapid forms of phthisis belong to the degenerate or "unfit" portions of the community. It is not so.

This fallacy of confusing those who die of phthisis with those who are tuberculized, tolerant and poisoned, and perhaps degenerate, comes to light in strange places. Of course, there is further distinction to be made between the physically fit who are "susceptible," because they have not been immunized, and those whose immunity or tolerance breaks down under stress. Yet, all through our consideration of these problems we must not forget that of the threshold, which confronts us in the phenomena of anaphylaxis, in those of the "positive and negative phases," in the Limes null and Limes tod. of Ehrlich, and in countless other difficulties. The little more and how much it is: the little less, and what worlds away! We can never quite escape those eternal paradoxes—the approximation of opposites and the antagonism of similars, even in pathology; while in practical medicine they vex us when we have to decide between the application of an ice-bag or of a poultice. Still, even though it be but one side of the shield, it does seem necessary to urge that, in this case of phthisis and tuberculosis, we should recognize that safety may be found in tolerance, and that overmuch "resistance" may be fatal.

DISCUSSION.

Dr. J. E. SQUIRE said that a paper of this kind was of the greatest value, because many published contributions lost some of their force as isolated papers, and there was a distinct gain by correlating various investigations in this way. A periodic medical stock-taking was most helpful, showing, as it did, the trend of thought and the ideas it encouraged. Dr. Crookshank took as his starting point conditions which had been in existence for many years. The idea that one could not speak of tuberculosis unless giant cells were present was a good many years old, and he thought it was already dead. Those who had long experience with tuberculosis knew that it might assume forms which did not possess what was regarded as the signature of the disease. But one point in the paper required a great deal of thought—namely, the question whether persons who had been infected with the tubercle bacillus, but did not show marked disease, might not, nevertheless, have changes taking place in their tissues as the result of the action of the bacilli and their toxins, which would entitle them to the name "tubercular." He did not doubt that a large proportion of those who without signs of disease reacted to tuberculin tests were of that class; they were instances of an attenuated virus in a resistive body. This idea that the bacillus of tuberculosis could affect the body without producing definite disease was one which, though not new, could well stand emphasis. It could be applied to many conditions other than tuberculous ones, perhaps to most bacillary diseases. In a paper which he published sixteen years ago that idea was set forth in regard to both tuberculosis and pneumonia. The idea of the present paper, he took it, was not so much to call forth discussion at the moment as to cause members to think and reflect as to the trend of view at the present day: as such its value could scarcely be over-estimated.

Dr. F. PARKES WEBER agreed that Dr. Crookshanks's paper was one which made persons think, but it was too long for immediate discussion. With reference to the writings of Poncet and Leriche, it was possible for men to make good theoretical suggestions, and yet to adduce cases in support which by no means sufficiently upheld their views. Those who read the accounts of the cases of "tuberculous rheumatism," &c., brought forward before the medical societies of France in support of Poncet's views would agree that many were of the most inconclusive character. In spite of that the theoretical contentions of Poncet and Leriche in regard to the whole subject of "inflammatory tuberculosis" contained doubtless some elements of truth.

Dr. BUCHANAN expressed his agreement with the expressions of appreciation of the paper, especially as it put members in possession of facts and observations which some of them would not have acquired otherwise, as all did not find time to keep pace with the literature of the subject. He wished to ask a question about the inflammatory and other conditions which had been referred to as probably connected with a tuberculous state. If these were so common one would expect to find an excessive proportion of them among children in tuberculous families where the parents suffered from that disease. Had observations been extensively made on that point, and did they bear out this expectation? If those and like conditions must be assumed to be really tuberculous or pre-tuberculous, that must be rather an argument against the adoption of the prophylactic measures against the disease which Calmette recommended. If as the result of vaccinating children with doses of attenuated organism or its poison during early life, children were going to be produced who were weakly, stunted in growth, and liable to those indeterminate inflammatory conditions which might be followed by definite tuberculosis, it would be better to avoid such prophylaxis. He felt also in a difficulty in understanding whether these conditions were to be attributed to the fact that there was a tuberculous toxin affecting the body as the result of the existence of a small tuberculous lesion, or to the existence of bacilli in small doses without any anatomical signature of tuberculosis at all. So far as he had followed the results of animal experiment, especially those of the Royal Commission on Human and Animal Tuberculosis, there had been little or no evidence that the result of inoculation of small doses of tubercle bacilli, even of an attenuated strain, was to produce a pathological condition in which no anatomical tubercles were present. It appeared that if in some circumstances the animal was inoculated with a different strain, such as the bovine with bacilli of the human type, or the pig with the avian, there was a different result: sometimes no anatomical lesion was found, but the bacilli persisted and could be recovered from the spleen or liver. But when the experiment was done with a type normally virulent for the animal, then, however small the dose, the effect was shown in anatomical lesions. It would be unreasonable at this stage to ask for proof whether these suspiciously pre-tuberculous or slightly tuberculous conditions were protective or not. On the clinical side the question first arose as to what was the relation between definite glandular and surgical tuberculosis of children, and the occurrence of pulmonary tuberculosis in later life. He had the impression that there was no excessive incidence of pulmonary tuberculosis in children with tuberculous glands and joints, and would like to know whether the evidence went still further in this direction—i.e., that children with, for example, tuberculous spines or hips, were actually less prone to phthisis in later life than the normal population. Assuming this to be so, however, it did not necessarily follow that the minor degrees of tuberculosis—where the disease was merely suspected to be tuberculous or pre-tuberculous—were equally protective; and again how far was it true, in the case of susceptible animals, that the inoculation of small doses of tubercle bacilli virulent for the species produced tolerance to larger doses administered later on? A question arose about McConkey's theory as to the reason underlying the localization of the tubercle bacillus in the human being. Dr. Crookshank said he had extended the theory and observations of that author. He (the speaker) had not read McConkey's words, but it occurred to him that perhaps they were not intended to be taken too seriously.

Dr. W. A. **Bond** desired to congratulate the author on his instructive paper. Taking, for example, small-pox vaccination, it was the inoculation of a small dose of modified small-pox which conferred immunity against further invasion for a series of years, after which lowered resistance or a large dose of the poison broke down the resistance. The same could be said of tuberculosis. The majority of urban children contracted tuberculosis. If only one gland was affected, there was immunity for a time, perhaps until the stress of work or bad surroundings, or both, broke down the resistance, and then phthisis developed. But the prevention of consumption was really an economic problem, intimately mixed up with the proper feeding and housing of the poor. Syphilis and "606" might be given as another example. In the spring he heard Dr. Crookshank say that in France when "606" was being used, patients after being cured came back with a fresh contraction of the disease, and in some cases this happened three or four times. In the case, again, of measles, there were children having had small doses of the measles poison who got an overdose and showed the symptoms of the disease. When measles first attacked the inhabitants of the Fiji Islands it was very severe, and the death-rate was very high. The author spoke of duplex causations, and he (the speaker) thought that was so with many diseases; inflammations were produced by a variety of agencies. Mr. Arbuthnot Lane in a very instructive paper on "Intestinal Stasis" stated that he had been able to relieve many tubercular joint conditions by relieving the stasis, either by medicines or by operation. He might add that Mr. Lane also showed that the prevention of constipation was most important in reference to the prevention and cure of other diseases, such as rheumatoid arthritis and cancer.

Dr. HALLIDAY SUTHERLAND, while he much appreciated the paper, was not prepared to admit the novelty of the views set out. A good deal of the teaching, summarized as that of the French school, he had himself received some years ago from Dr. R. W. Philip, of Edinburgh. The paper they had heard would do much to break down the artificial watertight compartments into which different stages of tuberculosis had been erroneously placed. Every stage of the disease was due to the tubercle bacillus, and to associate it with the presence of tubercles was to return to the pathology of Laennec. The early infection of childhood was due to the same morbid cause as was responsible for advanced pulmonary tuberculosis. To an archaic terminology was referable a narrow outlook on this disease. It would be well if they could do something to abolish the term "phthisis." This, according to the text-books, was an advanced pneumonic inflammation of the lung, characterized by râles, consolidation, and excavitation occurring, one was led to believe, in geometrical progression. If that were so, then phthisis was not synonymous with pulmonary tuberculosis. A child was found to have Philip's small glands above the clavicle, impaired resonance, and some diminution of the elasticity of the lung at one apex, associated with a positive tuberculin reaction. To what were these definite clinical signs due, and by what name were they to call this condition? Later on, in the presence of râles and tubercle bacilli in the sputum, the condition was generally recognized. His point was that pulmonary tuberculosis was a disease of infinitely longer duration than was generally admitted, and the key to its recognition lay in the refinement of clinical and bacteriological methods. It was the bacillus, the whole bacillus, and nothing but the bacillus. In every child presenting the signs of what was called a predisposition—long silky hair, long eyelashes, a lanugo-like growth down the spine, &c.—it was possible to demonstrate signs of definite infection. Sixty per cent. of the children of infectious consumptives were infected, while amongst the children of non-infectious consumptives infection was not greater than amongst the children of healthy parents. That was only to be expected, since the mortality from abdominal and meningeal tuberculosis was remarkably high amongst the children of infectious consumptives. Again, the suggestion was that the bacillus might be latent until, under the stress of life, conditions arose favourable to its aggressive development. In a co-ordinated measure against tuberculosis, such as the Edinburgh system, adequate account was taken of these "tuberculous seedlings," and of the essential unity of the infective process. To a general recognition of these facts, such analytical papers as the one they had heard to-night were most helpful.

The PRESIDENT (Dr. W. H. Hamer) said that, before calling upon Dr. Crookshank to reply, he would like to remark that he felt great difficulty in understanding precisely upon what evidence the proof of the causal relationship to disease of bacilli, having only "a feeble and furtive existence, here or there," or even no existence at all, was based. Thirty years ago the rules for conducting researches concerning causal bacilli were laid down by Koch, and at first they were adhered to as scrupulously as Nature observes the law of placing the heart on the left and the liver on the right side; but there had atterly been a tendency to ignore Koch's rules, and some present-day authorities were even exclaiming, with Sganarelle in the play, "We have changed all that." It had thus come about that Poncet and his followers, in considering the question of causal relationship of bacilli to disease, gave their critics considerable cause for complaint. The situation created, indeed, did not greatly differ from that on the croquet-ground in "Wonderland," when, as Alice says, "They don't seem to have any rules in particular; at least, if there are, nobody attends to them, and you've no idea how confusing it is."

Dr. CROOKSHANK, in reply, thanked those who had taken part in the discussion, but said he was very disappointed in one respect. Two or three speakers thought he laboured under the impression that he was bringing forward entirely new observations. As a matter of fact, much of what he said was already out of date when he was a medical student. His chief object in reading the paper was to show that views which passed as advanced on the Continent, and which had not been accepted in London save by some experts, were really based on observations made long before even the time of Laennec. He knew that Dr. Squire and many others had done good work on these lines; but Dr. Squire would perhaps admit that the views he had expressed twenty years ago had not met with the recognition which they deserved. He asked what text-book of medicine read in London gave an adequate description of the work of Poncet and Landouzy. It was fifteen years since the question of tuberculous rheumatism was brought forward, yet when lately there was a "symposium" at one of the London medical societies on rheumatoid arthritis, and experts from most of the London hospitals were gathered together, the subject was ignored till towards the end of the discussion a general practitioner said he thought there was a scrofulous influence at work in some rheumatic joints. He met with no support. So he (the speaker) thought he had been justified in bringing these notions forward, as new and yet old. Doubtless there had been a continuity of sound clinical opinion from the time of Hippocrates down to that of Dr. Squire to-day, which had kept the light burning. But, so long as in modern text-books tuberculosis was defined as a disease characterized by the presence of tubercles, the bacilloses of Landouzy were out of court. He agreed with what Dr. Parkes Weber had said about Poncet's work; when reading that author's last book, it had seemed to him that some of the cases were supported on almost fanciful grounds, yet one must admit he had got hold of a very fine idea and that there was much truth in what he and his school said, far more than his detractors were willing to admit. He (Dr. Crookshank) was interested in the way that the specialists had come forward and supported Poncet's views. At the meeting of the British Medical Association at Liverpool a French ophthalmic surgeon (Dr. L. Dor[1]) brought forward a number of cases of iritis and keratitis in which there were no tubercles, nor giant cells, nor tubercle bacilli, yet they cleared up under tuberculin. A celebrated oculist of Amsterdam had recently brought forward as an original notion of his own an elaborate theory of ophthalmic scrofula: but it was really Poncet's. Dr. Buchanan had very acutely raised the point that Calmette's notion of vaccination was a matter to be received with great caution in view of Poncet's notions: the question to be decided was whether it was worth while paying the possible price of some systemic alteration for the benefit that might accrue. Dr. Buchanan put his finger on one of the weaknesses of Poncet's pathology when he asked whether some of his "inflammations" were consequences of a small tuberculous focus elsewhere, or whether the tubercular poison was supposed to be resident in the lesion itself. That was the pathological crux of the whole of Poncet's work. But Poncet had evaded it. Exactly the same difficulty occurred when Landouzy declared most simple pleuritic effusions to be of tubercular origin. Poncet talked about an attenuated poison, but did not say whether he meant a soluble poison or a definite organism. Was not the question likely to be solved by finding that the *Bacillus tuberculosis* was a polymorphic organism, as the lepra bacillus was now known to be? Mr. Foulerton had in England shown the bacillus to be a streptothrix, and at Davos observers had been working on those lines for many years. Now we have not only to accept a great deal of Much's work, but to consider the recent reports from Germany of the bacillus having a non-acid-fast phase, as well as a coccus form. If this work were found to be accurate, many difficulties would disappear. Dr. Buchanan had asked whether McConkey was serious in speaking about the parasite getting ready for extrusion and so on. It might sound ridiculous, but since it was known how the malarial parasite got ready for the mosquito, and how filaria came out of their lairs at the appropriate time, he did not see why the tubercle bacillus should not be allowed to be at least equally intelligent. One question that must be settled before one could get much further in the matter was the actual importance of "reinfections." Calmette insisted on this; others did not do so. With reference to Dr. Sutherland's remarks, he (the speaker) appreciated the wonderful work that Dr. Philip had been doing in Edinburgh, and he regretted it was not known better in London. With deference to Dr. Sutherland, however, he preferred to retain the term "phthisis." He had not, as Dr. Sutherland thought, suggested that the toxins from a tuberculous mother affected her child in the womb, and so set up the state of scrofula, but the idea that scrofula was the result of the action of tuberculo-toxins on the growing child was, of course, an old one, though, like many old ones, recently revived with fresh justification.

---

[1] *Brit. Med. Journ.*, 1912, ii, p. 1031.

Epidemiological Section.

January 24, 1913.

Dr. W. H. HAMER, President of the Section, in the Chair.

The Behaviour of Diphtheria in Schools.

By J. A. H. BRINCKER, M.B.

IT is proposed in this paper to give some account of the behaviour of diphtheria in London schools. A number have been chosen from those under special observation, and a short history of the epidemic prevalence with the preventive action taken has been added to illustrate the character of each in turn.

The discovery by Klebs that diphtheria was due to a living germ, by Loeffler that this germ could be cultivated outside the body under suitable conditions, the easy methods now available for demonstrating its presence by culture in the throat of the sick, and the more recently gained knowledge of its persistence and reappearance in certain individuals, have placed additional means at our disposal for the control of the disease. Most hospital and local authorities now possess well-equipped laboratories for the diagnosis of diphtheria and its control amongst communities.

Every case of the disease has by law to be notified to the health authorities, who usually possess well-equipped means, such as isolation, disinfection of room and clothing, examination of contacts, quarantine of suspects. They are thus able to deal very effectively with the disease and to prevent its spread. In fact, most education authorities now issue well-established rules and regulations whereby teachers, nurses and others who come in contact with children, are taught the elementary laws which govern infection and epidemiology, and are encouraged to watch for suspicious illnesses and report them to the health authorities. By this means a kind of voluntary and subsidiary notification of infection becomes possible. It now only rests with the health and education authorities to collect the information, institute inquiries, and by this and other means at their disposal prevent the spread of the disease at school or the loss of life at home.

It is most interesting to note how the epidemiological characters of diphtheria have changed within living memory. Previous to the eighties diphtheria was a disease of the rural population, but it is now essentially a disease of urban communities. Longstaff, in a paper on the "Geographical Distribution of Diphtheria" (1889), examined the diphtheria statistics of England and Wales for the years 1855-80, and showed that the death-rate was greatest in the sparsely populated districts and least in the densely populated. Since 1880 diphtheria, "which has always displayed a marked tendency to prevail in sparsely populated districts rather than in centres of population, is undergoing a change of distribution, by which the chief urban districts seem to be approaching nearer than before to rural districts in their rate of suffering from this disease." The statistics for diphtheria in subsequent years show a distinct rise in urban populations, and more particularly so in London.

(I) The statistics published by Sir Shirley Murphy [6] make this quite clear: "The well-recognized tendency of diphtheria to spread in schools naturally presents itself for examination, and the new departure I have noted needs to be considered in connexion with the Elementary Education Act of 1870 [6, *a*]. This Act came into operation in 1870, and since that time children have been increasingly aggregated in schools where opportunity for the communication of the disease from one to another necessarily occurs."

"If increased school attendance has been responsible for the greater incidence of diphtheria in children of school ages, it is to be expected that the increase of diphtheria would in point of time correspond with this increased attendance."

Sir Shirley Murphy gives a table for London for 1871 which shows a notable increase of diphtheria on the age-period 3 to 10 years. This increase, Sir Shirley Murphy adds, "has been maintained more or less ever since, and has in later years been much accentuated." In a subsequent report Sir Shirley Murphy remarks that if the age-period 3 to 15 years be taken, these figures show a similar increase. In this report the figures taken are those for diphtheria and croup, as being more reliable. Later on in the same report Sir Shirley Murphy states: "A further point consistent with school influence deserves passing comment. It has been pointed out by Dr. Downes that the mortality of females from diphtheria is greater than that of males. Thus in England and Wales in 1861-70 the male death-rate at all age-periods was to the female death-rate as 100 : 108. This difference is more marked at the school age-period of life than at all ages. The statistics of more recent years show that these differences are diminishing, and this might be due to any circumstance, such, for instance, as school life, tending to subject the sexes to more equal conditions.

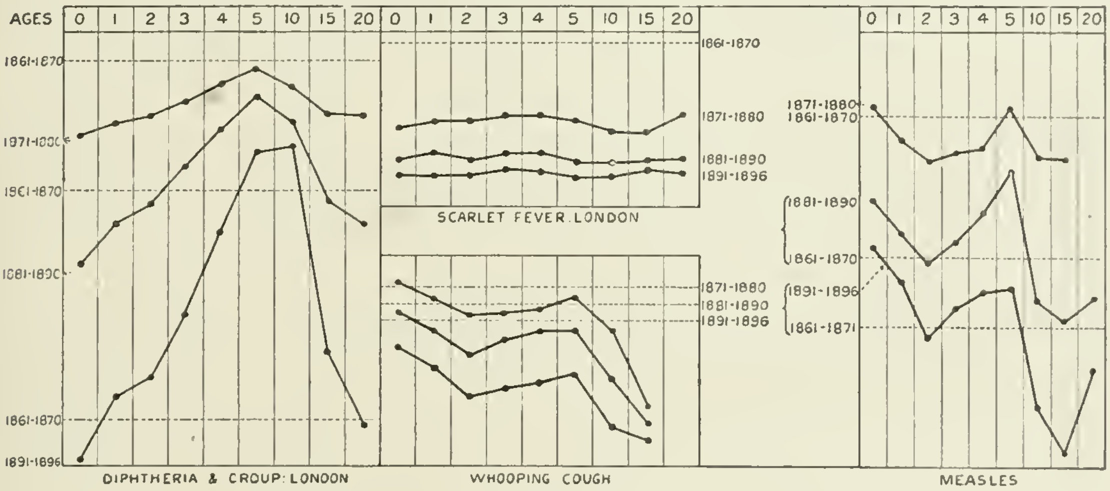


Fig. 1.

Table I.—England and Wales.

	Males, aged 3 to 15	Females, aged 3 to 15	Males, all ages	Females, all ages
1861-70	100	129	100	108
1871-80	100	124	100	107
1881-90	100	119	100	106

"It is impossible to draw conclusions from these figures only as to how much of the prevailing diphtheria may result from the condition which has thus relatively raised the rate of mortality at the school age-period of life, but it is obvious that disease contracted by children of school age has opportunity for communicating itself to younger and older persons, just as disease contracted by infants and older persons may lead to the infection of children at the school age-period of life."

(II) In 1896 Dr. W. H. Hamer investigated an outbreak of diphtheria in the district of Lewisham [5]. His report on this investigation is a classic worthy of serious study even in these bacteriological days. The same causes which were at work then in spreading disease are at work to-day, in spite of serum tubes and other modern refined methods of investigation. Reading between the lines of the report we see our "bacteriological carriers," "missed" and "unrecognized cases"—although not known in those pre-bacterial days; Dr. Hamer, no doubt, suspected them, for he refers to such cases under the generic name of "throat illness." The following quotation from his report refers equally well to the behaviour of diphtheria in my set of schools A and B in 1911 as they did to Dr. Hamer's investigation in Lewisham in 1896. Dr. Hamer says:—

"The question as to the part played by personal contagion now requires to be considered. On making inquiry as to which class in the school was attended by the first sufferers in affected households, it transpired that the two schools attended by children suffering from diphtheria were by no means affected equally throughout their whole extent. Thus, limiting consideration always to the case of first sufferers in families, it was proved that the 'girls' attending the *Board School* had suffered to a much less extent than the 'boys' and 'infants,' and, further, that while the upper classes in the 'boys'' school had escaped, the three lowest classes had suffered most severely. In the *National School* the 'boys' had escaped altogether, and so had the upper classes of the 'girls'; the lowest class of the girls had, however, suffered severely, and cases had occurred amongst the infants.

TABLE II.—PERCENTAGE OF CHILDREN IN EACH CLASS ATTACKED (FIRST SUFFERERS).

BOARD SCHOOL.						NATIONAL SCHOOL.					
Boys		Girls		Infants		Boys		Girls		Infants	
Class	Per cent.	Class	Per cent.	Class	Per cent.	Class	Per cent.	Class	Per cent.	Class	Per cent.
1	0	1	0	1	7·9	1	0	1	0	1	0
2	0	2	0	2		2	0	2	0	2	6
3	0	3	0	3	0	3	0	3	0	3	4
4	2	4	1	4	6·12	4	0	4	0	4	0
5	6	5	2	5		5	0	5	23	—	—
6	7	6	2	6	1	6	0	—	—	—	—
7	9	7	0	—	—	7	0	—	—	—	—

"Hence in each of nine classes upwards of 5 per cent. of the children were attacked. It will be noted that the boys' department at the *National School* escaped altogether, and that the attacks in the girls' department affected one class only. In the girls' department at the *Board School* comparatively few cases developed, and the last class in this department presents a striking contrast to the corresponding class at the National School. In the infants' department at the *Board School*, Classes 1 and 2 occupied one room, as did also Classes 4 and 5. Class 6, the 'babies,' had a room of its own, and suffered comparatively slightly, while Class 3, which also had a room of its own, escaped altogether. If the proportion of first sufferers in children attending the nine classes most affected be compared with the proportion of first sufferers in other children of the same age in the affected area in this period, the former group of children will be found to have suffered at a rate eight times the rate of the latter.

"Consideration of what has been stated, and an examination of the annexed table (II), shows that, without doubt, particular classes in these two schools were largely operative in disseminating disease. It is worthy of note that the several departments of the two schools were not equally affected in point of time. The boys' department of the Board School was already involved for more than a week before the special incidence upon the infants' department of the same school, and upon the lowest class of the girls' department of the National School, was developed. It will also be noticed *that cases of* 'THROAT ILLNESS' *affecting boys belonging to the Board School occurred during the latter part of July.* The history of cases of diphtheria occurring in the affected area for some time prior to the school holidays has been inquired into, and it transpires that children attending both schools had been attacked before the holidays; *and in some instances there are indications that disease had spread by means of mild cases of illness, the nature of which had not been recognized.*"

Sir Shirley Murphy adds that Dr. Hamer, when directing his attention to ascertain the cause of the outbreak, "found that as long ago as the preceding year the neighbourhood, in which the schools were situated, had begun to suffer from an amount of diphtheria somewhat in excess of that which had been observed in previous years, and in the few weeks antecedent to the August holiday several cases of *throat illness* had occurred among children attending school. Within a fortnight after the schools reopened cases began to manifest themselves among school children, who were the first persons in their respective familes to be attacked. From these facts, ascertained by Dr. Hamer, it is clear that up to the middle of September the incidence of such attacks was mainly on the younger classes of the boys' department of the Board School, and that later the disease affected the infants' department of the Board School and the girls' department of the National School."

(III) Finally, in summing up his report [6], Sir Shirley Murphy says:—

"(1) That with increasing school attendance and corresponding increase of opportunity of infection at school, the result should be manifested in increased incidence of diphtheria mortality upon children of school age.

"(2) The change in age-incidence of mortality had its beginning about the time that compulsory attendance had its beginning.

"(3) This has affected the country as a whole, and has not only been maintained ever since, but has steadily grown in proportion."

It is thus clear that since the passing of the Education Act: (1) diphtheria has become much more prevalent in urban communities; (2) the age-incidence has fallen very heavily on the younger members of the community (3 to 14), and particularly on infants (3 to 6) [11]; (3) that the opportunities of infection become proportionately greater in a concentrated susceptible community such as obtains in an elementary school; (4) that infection is spread more particularly by cases of throat illness—that is, by mild and unrecognized cases, or even by those who may show no symptoms whatever.

If we accept these conclusions as true in principle, it follows that all preventive measures, whether already applied to school epidemics of diphtheria or to be introduced at any future time, must be based on a knowledge of these facts. When public health and school doctors undertake to investigate the course of diphtheria in schools swabbing should be applied only secondary to a careful inquiry. Bacteriology is of the greatest value in such inquiries, but it has its limits. It is only after careful inquiry and reconstructing the course taken by an outbreak that the judicious application of bacteriology becomes of the greatest help to aid us in our search for the missing links. We shall then, perhaps, be able to discover the source and the method of spread of infection; whether by a convalescent carrier, one of Dr. Hamer's cases of "throat illness," a missed case, a precocious carrier, a contact otherwise healthy, or the chronic carrier, whether persistently or only intermittently infectious. But bacteriology must be carefully and rightly applied. Of late years we have learned to understand that there are true diphtheria bacilli and *diphtheroid* germs. We must differentiate between them in the future. Very few, indeed, now believe in the potency of the bacillus of Hoffmann, nor yet in its relationship to the true bacillus of Klebs-Loeffler [4]; we must learn to neglect its presence. Even amongst the different strains of true bacilli we can appreciate difference of virulence, and there are some bacteriologists who go so far as to believe that, within limits, there is no relationship amongst these germs. Again, experience has taught us to examine both throat and nose in everyone of our cases. In London this practice has been consistently applied during the last two years.

The literature dealing with diphtheria and its behaviour in schools is extensive, but I propose to refer to the following only.

(IV) One of the first complete bacteriological investigations of diphtheria in schools was carried out by Cobbett [2] during an outbreak of diphtheria at Cambridge, from October, 1900, to January, 1901. "The number of persons examined was 692. Some of them having been tested several times, the total number of examinations made exceeded 950. Among the 692 persons examined there were forty-two notified cases of diphtheria. Besides these there were about twenty-two other notified cases in the town which were sent direct to the hospital without a 'bacteriological examination.'" Amongst the conclusions arrived at by Cobbett were: "The principal means of combating diphtheria are, after the isolation of persons actually sick, the detection of those who go about, apparently in good health, carrying with them the diphtheria bacillus, and the isolation of such persons, and of convalescents from the disease until diphtheria bacilli can no longer be cultivated from them. No doubt the satisfactory isolation of healthy persons who carry the bacillus will often prove impracticable. In such cases the infectious persons should be warned that they are a danger to others, and instructed to take certain precautions. In the case of children isolation will usually be practicable, and experience among the poorer classes at Cambridge has shown that parents can usually be brought to consent to the removal of their children to an isolation home." Again: "With increasing confidence in the bacteriological test on the part of the medical profession and of the general public, such measures will be much facilitated."

In a subsequent paper Cobbett gives an account of a recrudescence of diphtheria in Cambridge during the following spring, and he gives a summary of his conclusions, chiefly in regard to the non-specific character of the Hoffmann bacillus, and to the various strains of *Bacillus diphtheriæ* discovered by him during the epidemic.

(V) Graham-Smith [4], after reviewing the subject up to 1908, states that "The proportion of those healthy persons who become infected with diphtheria bacilli by contact with patients, and yet do not suffer from diphtheria, depends largely on the intimacy of their connexion with the patients, varying from a mean of 66 per cent. in members of the family, if the conditions for spreading are favourable, to a mean of 8·7 per cent. in the less closely connected scholars in infected schools. The great majority of the bacilli which have been isolated from these contacts and tested on animals have been found to be virulent. In the throats and noses of healthy persons, who have had no opportunity of acquiring them by contact, virulent diphtheria bacilli are very rarely found, but bacilli resembling them in morphology, but differing in being totally without virulence for guinea-pigs, are much more common (2·6 per cent.)"

(VI) In an outbreak reported by A. E. Porter [8] in 1911, he attributed the spread of infection to two cases of chronic nasal carriers of long standing, who had been in contact directly or indirectly with cases of diphtheria. This outbreak, Porter states, was completely stopped by a vigorous campaign of swabbing and quarantine. It is of interest to note that the bacilli isolated in both these carriers were found to be non-virulent, though it must be recorded that they were not tested until after the lapse of some months.

Thomas [11], from a bacteriological survey of infected London schools, divides germ carriers into the following classes:—

(1) Eighty per cent. were mild and unrecognized cases of diphtheria.

(2) Twelve per cent. were healthy contacts from infected houses.

(3) Six per cent. were cases of intermittent or recrudescent infection after discharge from hospital.

(4) Two per cent. were perfectly healthy cases.

(5) He found the majority of carriers amongst children 5 to 8 years (85 per cent.), rarely amongst "babies" (3 to 5 years). But the heaviest incidence of disease occurred amongst children 3 to 5 years old, with a marked decline for children above 5 years.

It appears as if an increased liability for harbouring the bacillus of diphtheria was directly associated with a decreased susceptibility to an attack of diphtheria. These statistical factors I am able to confirm from a continuation of Dr. Thomas's work.

If, therefore, we are to control an outbreak of diphtheria in an infants' school, even though the babies' class alone may be attacked, it is of the utmost importance to search for bacterial carriers amongst the children in the department between the ages 5 to 8 years.

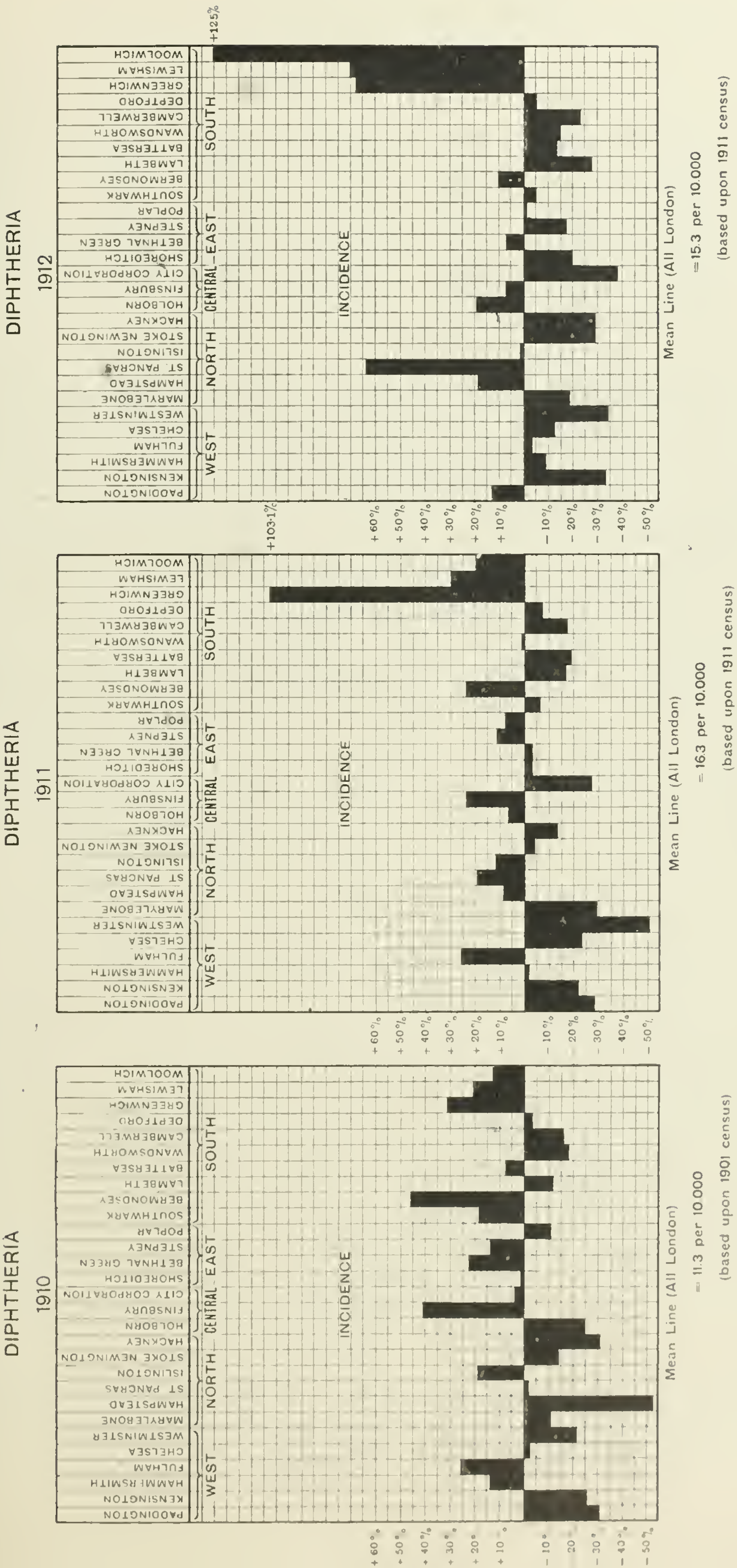

DIPHTHERIA
1910
1911
1912
INCIDENCE
WEST
NORTH
CENTRAL
EAST
SOUTH
PADDINGTON
KENSINGTON
HAMMERSMITH
FULHAM
CHELSEA
WESTMINSTER
MARYLEBONE
HAMPSTEAD
ST PANCRAS
ISLINGTON
STOKE NEWINGTON
HACKNEY
HOLBORN
FINSBURY
CITY CORPORATION
SHOREDITCH
BETHNAL GREEN
STEPNEY
POPLAR
SOUTHWARK
BERMONDSEY
LAMBETH
BATTERSEA
WANDSWORTH
CAMBERWELL
DEPTFORD
GREENWICH
LEWISHAM
WOOLWICH
+60%
+50%
+40%
+30%
+20%
+10%
−10%
−20%
−30%
−40%
−50%
+103·1%
+125%
Mean Line (All London)
= 11.3 per 10,000
(based upon 1901 census)
= 16.3 per 10,000
(based upon 1911 census)
=15.3 per 10,000
(based upon 1911 census)

FIG. 2.

TABLE III.—DIPHTHERIA AND CROUP DEATHS PER 100,000 OF POPULATION (LONDON).

1875	37·7	1885	39·7	1895	56·7	1905	12·2
1876	27·9	1886	31·2	1896	62·0	1906	15·0
1877	23·8	1887	36·5	1897	52·0	1907	17·0
1878	31·5	1888	43·9	1898	40·8	1908	16·0
1879	31·5	1889	43·1	1899	45·0	1909	13·0
1880	29·4	1890	45·1	1900	36·0	1910	10·0
1881	35·2	1891	44·0	1901	35·0	1911	14·0
1882	44·2	1892	52·5	1902	26·0		
1883	45·4	1893	80·1	1903	17·0		
1884	43·1	1894	66·0	1904	16·0		

The years of special epidemic periods of diphtheria in London were 1858, 1861-63, 1875-76, 1892-96. The possible causes which govern these epidemic cycles are interesting, but cannot here be discussed. The reader will find a full account of it in Dr. Newsholme's "Epidemiology of Diphtheria" [7]. Since the last epidemic the incidence of diphtheria has dropped each year, and there has for some years been very little diphtheria in London. As the laws which govern epidemics are as yet little understood, those causes which produce the present freedom from diphtheria are quite unaccounted for, or may only be surmised. But in spite of this general freedom of London from diphtheria it is singular to relate that diphtheria continues to occur with seasonal regularity in certain parts and in certain schools in London. For reasons not understood diphtheria has for some years been endemic in the south-east, more especially in the high-lying, better housed, and newer parts of London. As this applies also to other Boroughs of London at the present time we observe that diphtheria occurs mainly in the outer ring of the County.

I am beginning to believe that the Mendelian law of inheritance of unit characters may be an influencing factor: are we not breeding a race of children particularly susceptible to diphtheritic infection? Probably another causative agent is what may be called the antagonism of germs. We are told by Schiotz [10] and others [1] that the *Staphylococcus aureus* will outgrow diphtheria germs, and apparently diphtheria does not occur amongst the dirtiest members of the community. Another peculiarity of diphtheria is that it may invade a school, and, in spite of the epidemiologist and bacteriologist, will recur with singular regularity for one, two, or more years, and finally disappear altogether.

I now propose to give a short account of outbreaks of diphtheria in six schools in London, and to draw your attention to the outstanding factors in each of them (Tables V and VI, pp. 104 and 105).

(I) SCHOOL A.

During the autumn and winter of 1910-11 this school was entirely free from diphtheria. The first notified case was from room 6 of the infants on April 19. By the end of the summer holidays (July 31, 1911)—that is, in eleven weeks—seventeen cases had been notified in the whole school, with six deaths. Apparently no diphtheria occurred amongst the scholars of this school during the summer holidays, but there is no doubt that a good deal of infection prevailed in the immediate neighbourhood, for between August 28 and November 22 (twelve weeks) twenty-five further cases were notified in the ward in which this school is situated, and of these twelve children attended this school. Six of these twelve children attended room 3 of the infants, and two cases ended fatally. By January 8, 1912, thirty-eight cases had been notified from this school, and of this number thirty-three occurred in the infants' department. Cases of diphtheria still continued to occur in spite of all vigilance and care until July 10, 1912. The school was closed for the summer during August, and has remained free since. The total number of cases notified were :—

	Cases	Deaths
Infants	48	8
Boys	8	0
Girls	4	0
Total	60	8

Every care was taken to discover mild, unrecognized, or carrier cases. It was visited on twenty-four occasions, and the children throughout the school examined. As had been the practice of this department for some years, a planting on serum was taken in every case from both throat and nose. Every child found to be carrying Klebs-Loeffler bacilli or germs suspicious of diphtheria was excluded until a satisfactory certificate based on bacteriological examination had been produced. Several cases of clinical diphtheria were discovered attending school and were also excluded. On two occasions children recently discharged from hospital were subsequently found to be chronic carriers. These were re-excluded and kept out of school until the school doctor obtained satisfactory bacteriological results. One, E. L., remained infectious until lost sight of by the end of the summer term.

The cause of the epidemic prevalence of diphtheria in the neighbourhood of this school during the autumn and winter of 1910-11 can only be surmised, but it is certain that the prevalence during the spring and summer of 1911 was due to carriers of the kind referred to. When swabbing was undertaken on a large scale a number of children who had returned to school either from hospital or with a certificate based on bacteriological grounds were found carrying germs of diphtheria. The preventive measures adopted did not produce immediate relief, for the reason that the infection was too widespread and affected members beyond the control of the school authorities. Had swabbing been carried out at once, after a careful inquiry on epidemiological lines, the epidemic might, as far as we know, have been cut short. Swabbing, to have been of use, would have had to be extended to out-of-school cases also.

(II) SCHOOL B.

This school is situated in one of the poorer and more congested neighbourhoods of London. The first case occurred early in January in room 3 of the infants, and then spread rapidly throughout the department. As in the first school, it was frequently visited, and the children in all the departments subjected to a frequent and careful scrutiny. Several cases of clinical diphtheria were discovered in attendance, and immediately excluded. It is the practice in all Council schools where diphtheria is prevalent for the teachers to keep a careful watch over the children and to exclude immediately all cases of sore throat or suspicious illness, to notify them to the school doctor and the Medical Officer of Health, and not to readmit them until a satisfactory certificate has been produced. In this school the last part of these regulations was withdrawn, and all suspicious cases were examined by the school doctor himself. It may be mentioned here in passing that diphtheria was at this time also present in other schools in the immediate neighbourhood. This general prevalence, apart from school influence, may therefore be in part responsible for the continuation of the cases in this school.

In all, twenty-nine visits were made to the school; 253 children were bacteriologically tested on 399 occasions, and on fifty-six occasions Klebs-Loeffler bacilli were discovered, and on forty-two occasions suspicious bacilli. When germs suspicious of diphtheria were found in children they were excluded until a further examination had been made.

I have no doubt that both healthy and chronic carriers were responsible for this outbreak. On four occasions secondary cases occurred in the homes of children immediately after the discharge of the first case from hospital. Three of these primary cases were bacteriologically tested, but gave negative results; but the fourth gave, and continued to give, Klebs-Loeffler bacilli (chiefly from the nose) for about six weeks from the occurrence of the secondary case.

(III) SCHOOL C.

The characteristics of the outbreak of diphtheria at this school were its suddenness and severity whilst it lasted. At the time no diphtheria had been notified from the neighbourhood. On December 4, 1911, three cases were notified, and by the evening of December 5 seven cases were known to have occurred in this school. All of them came from two class-rooms in the mixed department, the majority from room 5.

Arrangements had been made to visit the school on the morning of December 5. At this visit all the children in the affected classes were examined, and suspicious cases swabbed for bacteriological examination; those absent at the visit were excluded, pending inquiry at their homes by the Medical Officer of Health. The dates of last attendance of the notified cases were as follows:—

One case	November	28
Five cases	,,	29
One case	,,	30
Four cases	December	1
Two cases	,,	5
Two cases	,,	8
Five cases	,,	21

Subsequent inquiries pointed to a certain child who, though ill on November 27, continued to attend school until the afternoon of November 29. During these two days he had been attending lessons in two rooms (Nos. 5 and 7), and probably was responsible for most of the cases in these two rooms.

Fifteen children from a neighbouring orphanage attended school until December 1; on this date one of them failed with diphtheria, and the remainder were kept at home; of these, three others failed with diphtheria during the next few days. Teachers were instructed to segregate the classes and to keep a strict watch for suspicious illness, and the two affected classes were closed from December 5 to December 11.

The school was kept under observation and six visits made to detect bacteriological carriers. The infants' school subsequently also became affected. In the two departments seventy children were tested bacteriologically, and of the eighty-nine tests thirteen gave the Klebs-Loeffler bacillus.

Two carriers were subsequently discovered. One is of special interest for my thesis. He was apparently examined at a period when not discharging diphtheritic germs and allowed to return to school. The following summary gives the important facts of the case: C. C., aged 12. Throat unhealthy on December 5; culture showed Klebs-Loeffler bacillus. December 13: Certificate produced—freedom from infection based on bacteriological grounds—teacher readmitted him. December 19: At my next visit to the school my attention was drawn to this boy. He had no discharge from the nose, but only crusts; boy picked his nose and there was a tendency to bleeding. Bacteriological examination now gave Klebs-Loeffler bacillus in both throat and nose; again excluded. On testing Klebs-Loeffler bacillus from this growth it was found to give the glucose broth reaction and slight virulence to animals. Klebs-Loeffler bacillus was isolated on five subsequent occasions. Those bacilli isolated on January 25 were re-tested: the result was a positive sugar broth reaction, but no virulence for animals. He was allowed to remain at school, but kept under close observation until April. During this time the nasal crusts had disappeared, and though the tonsils were enlarged there was no inflammation. Klebs-Loeffler bacilli were found until March, but by April they could not be found.

(IV) School D.

This outbreak was at first limited to one class-room, attended by boys who had recently been transferred from the infants' school. The corresponding girls and the infants remained free. The outbreak was finally brought home to a boy who was readmitted by a misunderstanding on the part of the teacher, and later again on a bacteriological certificate. He was found to be a carrier. The net result was five notified cases with one death and sixteen bacteriological cases in a class of sixty boys (26 per cent.). I visited the class on nine occasions. At the fifth visit I swabbed every boy in the class, and amongst the apparently healthy found five Klebs-Loeffler bacillus carriers (8 per cent.).

The history of the unrecognized case: C. B., aged 9, was absent from January 20 to February 19 with "chill and bad cold." On February 19 readmitted on producing this certificate: "No signs of diphtheria, bacteriological examination unnecessary." February 23: Re-excluded on advice of a school doctor. February 26: Readmitted on certificate, which stated "No Klebs-Loeffler bacilli present." As further cases continued to occur in this class-room, C. B. was re-tested on March 20 and found to be harbouring Klebs-Loeffler bacilli. He was excluded and remained out of school until May 24.

Carrier cases therefore are of importance in school outbreaks: the infection not only may be of long standing, but it may also be intermittent in character. The following gives the history of another carrier: As cases of diphtheria continued to occur in a certain school, G., teachers were advised to exclude all cases of sore throat or suspicious illness. A boy, T. R., aged 13, was excluded on January 19 with "swollen tonsils." February 13: Medical Officer of Health took a culture; result, Hoffmann's bacillus. February 24: Medical Officer of Health took a culture: result, Klebs-Loeffler bacilli; parents advised to get the boy's throat treated. March 8: Klebs-Loeffler bacilli still present. March 27: Hoffmann's bacillus only found; no treatment obtained; parents again advised. April 10: Klebs-Loeffler bacilli found, and notified as bacteriological case. April 12: Removed to hospital. April 25: Discharged from hospital with certificate "not diphtheria." May 20: Medical Officer of Health finds Klebs-Loeffler bacilli; tonsils still enlarged; no treatment yet obtained; Medical Officer of Health desires exclusion of other children from home. June 7: Parents not only refuse treatment, but apply for readmission of children to school. Plead boy had no diphtheria when discharged from hospital. June 10: Father writes to Education Authority complaining of the exclusion from school of his children and demanding immediate readmission. Refuses treatment. June 17: T. R. "swabbed" by school doctor; Klebs-Loeffler bacilli found; parents advised to seek treatment. June 26: Boy again "swabbed"; Klebs-Loeffler bacilli in both throat and nose. July 5: Another letter from father asking for readmission of a brother. July 8: Arrangements made at a hospital for enucleation of tonsils. This was carried out. August 26: After holidays all members "swabbed"; no suspicious germs found. August 27: Children readmitted to school.

(V) SCHOOL E.

Three children attending room 6 of the infants' department were notified on June 13, 15 and 21 respectively. The child (No. 2) notified on June 21 was subsequently found to have had rhinorrhœa for a month, whilst still attending school. She last attended on June 18, and on

June 21 was notified as suffering from nasal diphtheria. On June 6 a niece (aged 15) of the class teacher (M. K.), living at the same address, had also been notified suffering from diphtheria. This girl having only just recovered from rheumatism, had not yet been out of the house. In spite of this case, the teacher continued at her duties until June 17. On this date she was asked to absent herself from school until a bacteriological examination had been made. She stated that she had had no contact with her niece, and as the latter was immediately removed to hospital and the premises disinfected, she did not stay away from school.

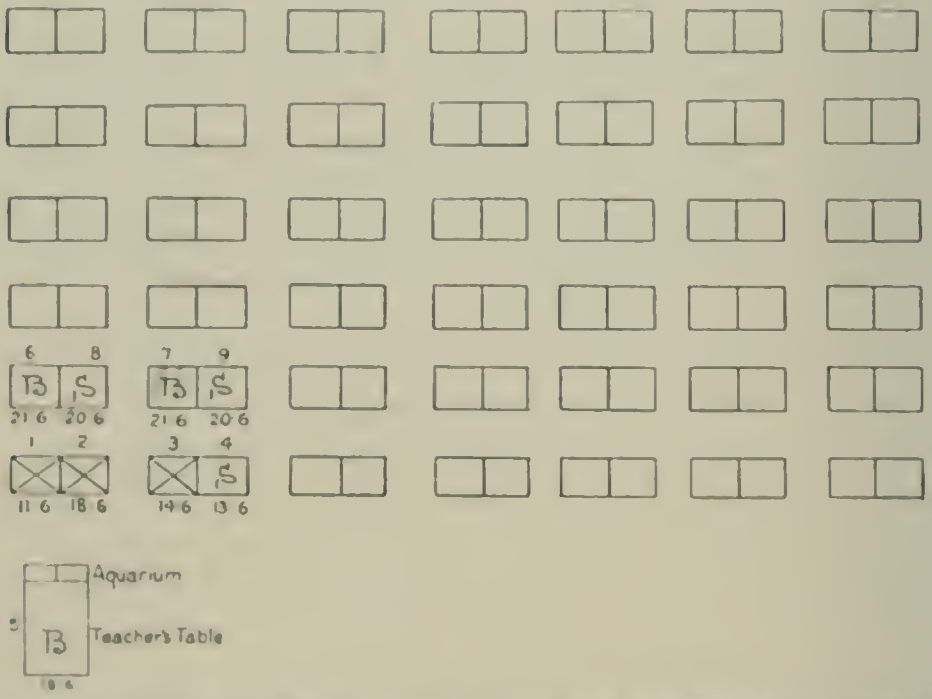
TABLE IV.—DIPHTHERIA INVESTIGATION.

E School. Infants' Dept.

Seating accommodation in Class-room 4.

The affected children or possible carriers are indicated thus (within the square):—

Diphtheria cases	X.
Bacteriological cases	B.
Sore throat or other suspicious cases ...	S.
Diphtheria in house (=Contacts)... ...	H.



Note.—Each oblong represents a dual desk, and each square a child's seat. The affected children and dates of their last attendance at school are given in each case.

On June 18 she was bacteriologically tested by me. The throat and nostrils appeared quite healthy, but she had Klebs-Loeffler bacilli in both throat and nose. She was re-examined from time to time after this date, but in spite of local treatment remained infectious until August 23 (sixty-eight days). She resumed her duties after three successive negative results had been obtained. It is quite impossible in this case to say definitely whether M. K. or case No. 2 was the primary case and responsible for this local outbreak.

(VI) SCHOOL F.

This is a residential school for sixty girls, with a staff of eight adults. The school and its grounds are quite isolated and in good sanitary repair. There is very little opportunity for communication with the outer world. The epidemic history of this school is closely associated with one of the scholars, named R. C. (aged 12), and doubtfully with another, E. M. R. C. certainly was a carrier at some time or another both of scarlet fever and diphtheria, and the chronicity of her infective state still persists and has now extended over an extraordinarily long period.

R. C. was admitted to this school on January 1, 1910. On December 29, 1910, she contracted scarlet fever and was removed to hospital. She was discharged from the Metropolitan Asylums Board hospital on March 27, 1911. Following the usual custom, she was placed in quarantine at the school. Although apparently well in herself, she was reported to have been discharged with a sore finger which was bandaged. A few days later a portion of bone was removed from the finger. She remained in isolation until April 1, and as she had quite recovered was allowed to mix with the other girls, sleeping in a dormitory (No. IV) with twenty-seven others. On April 3 a girl from this dormitory was isolated on suspicion of scarlet fever; this was confirmed on April 4, and the child removed to hospital. Of the twenty-seven girls occupying Dormitory IV, fourteen contracted scarlet fever, and twenty-one of the sixty girls in the school, while fifteen others were in isolation for some time on suspicion.

R. C. was re-notified and returned to hospital on April 12. She remained in hospital until May 27, 1911. After another fourteen days' quarantine at the school she was allowed to mix with the girls in Dormitory IV. On July 27 a girl from Dormitory IV was notified with diphtheria; arrangements were made for immediate segregation and bacteriological examination. The next day another girl from the same dormitory was isolated with sore throat. and a bacteriological examination showed the presence of Klebs-Loeffler bacilli

She was notified and removed to hospital. The result of the bacteriological survey was: Twenty-five girls (42 per cent.) were found harbouring Klebs-Loeffler bacilli, four only showed Hoffmann's bacilli, and twenty-nine gave a negative test. Those showing Klebs-Loeffler bacilli were segregated as far as possible, kept under observation, and retested from time to time. With two exceptions most of the twenty-five cases harbouring Klebs-Loeffler bacilli cleared up rapidly under treatment. They were R. C. and E. M.: it was considered advisable to notify them and send them to the hospital as bacteriological cases. R. C. was removed on August 16 and E. M. on August 18. By August 28 all suspicious cases had cleared up, and the school was declared free from infection.

R. C. returned from hospital on September 2, placed in quarantine, and a swab taken. Klebs-Loeffler bacilli were found, and she returned to hospital on September 3, 1911. On November 2, 1911, she was discharged, and returned to the school. The first two swabbings gave negative results, but the third, fourth, fifth, and sixth showed Klebs-Loeffler bacilli. She was re-notified and removed to hospital on November 11, 1911, where she remained until April 4, 1912.

Meanwhile, E. M. had also been discharged from hospital on November 8. On this date the bacteriological test was negative, but on November 11 suspicious germs, and on November 15, 16, and 17 Klebs-Loeffler bacilli were discovered; but as she had been isolated with R. C., she may have been infected by her. She returned to hospital on November 17 and remained there till January 15, 1912. On returning to school she remained in quarantine for fourteen days, and having given two sets of three successive negative tests, was allowed to mix with the rest of the girls after a prescribed form of disinfection had been carried out.

R. C. returned to school on April 4, and was placed in quarantine. Klebs-Loeffler bacilli were obtained in the first culture taken from both the throat and from each nostril. As she had now been in hospital as a diphtheria carrier on three occasions since August 16, 1911, it was considered advisable to watch her in isolation at the school for a time.

The plantings taken from the throat and nose of April 12 were sent to the Lister Institute for examination. An abstract of the report is as follows:—

R. C.: Pure culture of *Bacillus diphtheriæ* obtained from nose and throat. No difference recognized between the two strains. Both fermented glucose, but not sucrose. Hence a true *Bacillus diphtheriæ*. Virulence test: $\frac{1}{10}$ c.c. broth culture injected into guinea-pig—alive after three days; 2·5 c.c. broth culture injected into guinea-pig—died in two days. Control: 3 c.c. broth culture, + $\frac{1}{10}$ c.c. antitoxin, injected into guinea-pig—alive. The bacillus is therefore of a strain of no great virulence.

Three sets of bacteriological tests were made each week from R. C.'s throat and each nostril. Sometimes all, at others one or two, showed Klebs-Loeffler bacilli: that is, if the throat proved negative Klebs-Loeffler bacilli could be recovered from one or both nostrils, but Klebs-Loeffler bacilli were always recoverable from R. C. during the period April 5 to May 31.

(II) On June 2 a girl in the school was isolated on suspicion and on June 3 she was removed to hospital suffering from diphtheria. Under the circumstances it was most advisable to take no risk, so R. C. was sent back to hospital. Once more the school was placed in quarantine and a bacteriological survey made of the whole school. The net result was that one girl, E. M., was found to give Klebs-Loeffler bacilli repeatedly and six others showed suspicious germs. R. C. and E. M. were sent to Tottenham Hospital on June 3 and the remaining six were isolated and discharged as soon as clear. Since the departure of R. C. and E. M. this school has enjoyed a clean health bill.

E. M., it will be noted, is the same girl who had previously been sent back to hospital. Whether she also was an intermittent and chronic carrier and the probable cause of the second outbreak in the school is difficult to say.

The subsequent histories of these two girls is an object-lesson. I am indebted to Dr. Frederic Thomson for the information. Between June 3 and June 28 no suspicious bacilli were recoverable from either R. C. or E. M.; but a report of June 28 states that Klebs-Loeffler bacilli had been recovered from both R. C. and E. M. Dr. Cartwright Wood reported them non-virulent, but he adds that it does not follow that virulent bacilli may not also be present. On July 4 Dr. Thomson wrote to say that the virulence of each would be tested every fortnight.

Report of August 13.—R. C.: Klebs-Loeffler bacilli isolated from both throat and nose; reaction—Neisser +, Gram +, sugar broth +, animals 0. E. M.: Klebs-Loeffler bacilli isolated from throat only; reaction—Neisser +, Gram +, sugar broth +, animals 0.

Report of October 11.—E. M. now fails to give Klebs-Loeffler bacilli. She returned to school on October 19 and was kept in quarantine until

TABLE V.—DIPHTHERIA CASES IN SCHOOLS.

School		Boys' department								Girls' department								Infants' department								Remarks
	Class	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	
	Age	—	13·14	12·13	11·12	10·11	9·10	8·9	7·8	—	13·14	12·13	11·12	10·11	9·10	8·9	7·8	7·8	—	6·7	6·7	5·6	5·6	4·5	3·4	
(I) A	..	—	—	1	—	1	1	2	3	—	1	—	—	—	—	3	—	7	—	8	3	10	10	5	5	First case, Infants, room 5, May 8, 1911; last case, room 8, July 10, 1912
(II) B	..	—	—	2	1	—	1	—	1	—	1	2	—	—	4	2	—	—	9	4	7	6	4	4	1	First case, Infants, room 6, June 19, 1911; last case, room 6, July 1, 1912
										Mixed Department																
(III) C	...	—	—	—	—	—	—	—	—	—	—	1	2	4	1	10	1	4	—	—	—	—	1	1	2	First case, Mixed, room 5, Nov. 29, 1911; last case, room 7, May 3, 1912
(IV) D	...	—	—	—	—	1	1	—	7	—	—	—	—	1	—	—	—	1	1	—	—	1	1	—	1	First case, Boys, room 8, Jan. 19, 1912; last case, room 8, May 3, 1912
(V) E	...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	5	1	1	—	—	First case, Infants, room 4, Jan. 12, 1912; last case, room 4, June 18, 1912; M. K. discovered +; excluded June 17, 1912
(VI) F		—	—	—	—	—	—	—	—	4 cases—Dormitory IV, 3 cases ,, III, 1 case								—	—	—	—	—	—	—	—	

TABLE VI.—BACTERIOLOGICAL TABLE.

Schools	Departments	Class or classes	Number of visits	Between these dates	Number of children bacteriologically examined	Bacteriological analysis					Remarks
						Number of examination	Klebs-Loeffler bacilli	Suspicious organisms	Hoffmann's bacilli	Negative	
(I) A ...	Boys, Girls, and Infants	All	24	July 17, 1911, and June 3, 1912	233	334	36	32	39	227	Throat and nose examined in every case
(II) B ...	Boys, Girls, Infants, Mixed	All	29	January 24, 1912, and July 17, 1912	253	399	56	42	43	258	Visits to Boys, 12; Girls, 16; Infants, 22; Mixed, 1
(III) C ...	Mixed and Infants	All	6	December 5, 1911, and April 25, 1912	70	89	13	5	1	70	—
(IV) D ...	Boys	No. 8	9	February 1, 1912, and June 21, 1912	82	146	20	5	126	—	—
(V) E ...	Infants	No. 4	2	June 21, 1912, and June 28, 1912	16	21	—	2	7	12	—
M. K. ...	—	—	8	June 6, 1912, and August 26, 1912	—	8	5	—	—	3	M. K.'s niece notified Δ June 6, 1912 (out of school case); M. K. excluded, June 16, 1912
(VI) F ... (1) First outbreak	Girls	All	21	July 31, 1911, and August 28, 1911	60 (+ 8 adults)	276	60	5	23	188	The children gave these results: Klebs-Loeffler bacilli, 31 children; Hoffmann bacilli, 4 children; negative, 29 children
(2) Second outbreak	Girls	All	—	June 5, 1912	60	85	3	5	18	59	Analysis in regard to children gave these results: Klebs-Loeffler bacilli, 3 children

October 29. As she continued to give satisfactory bacteriological results she was allowed to resume her schooling on October 30. R. C. continued to give Klebs-Loeffler bacilli results until December 15, 1912. From December 15 to January 15 tests from R. C. for Klebs-Loeffler bacilli were all negative, but since January 16 they have reappeared and Dr. Thomson states they are now plentiful. The diphtheria bacilli from R. C. have been tested for virulence on several occasions since July, 1912, and were found non-virulent except on one occasion, November 5, 1912, when the bacilli from the nose were found to be virulent.

R. C. is therefore the most remarkable chronic but intermittent carrier I have met. She has been responsible for one outbreak of scarlet fever and probably two of diphtheria within a period of fourteen months; she has, moreover, been a carrier of diphtheria bacilli for at least nineteen months, yet there is no history that she ever suffered from any symptoms of the disease.

The *carrier* problem is, therefore, of greatest importance in the control of diphtheria. But these carriers may vary between very wide limits. A carrier of this disease may never have suffered from diphtheria, even from a mild sore throat; the mucous membranes may appear normal, and the Klebs-Loeffler bacillus may only be intermittently recoverable. Some six years ago, when working in the Croydon Borough Hospital, I was able to demonstrate the Klebs-Loeffler bacillus in the finer branches of the crypts of a tonsil enucleated from a chronic carrier. Not only may the germs of infection be dormant in the tonsils, but they may be found in situations difficult or impossible to reach, such as the antrum of Highmore, or in the frontal or ethmoidal sinuses.

Other factors which influence the control of diphtheria in school are:—

(1) Inability to follow up and examine absentees before returning to school.

(2) Impossibility of examining contacts outside school age.

(3) A single examination from a suspect, or an examination from the throat alone or nose alone, is insufficient evidence to warrant freedom from infection.

(4) Possibility of failing to recognize a carrier in school who appears quite normal.

(5) Opportunity in London school children of infection and re-

infection—Sir R. Thorne Thorne has called it "the rough and tumble play" outside school.

(6) Absence of control over Sunday schools, "happy evenings," and similar institutions.

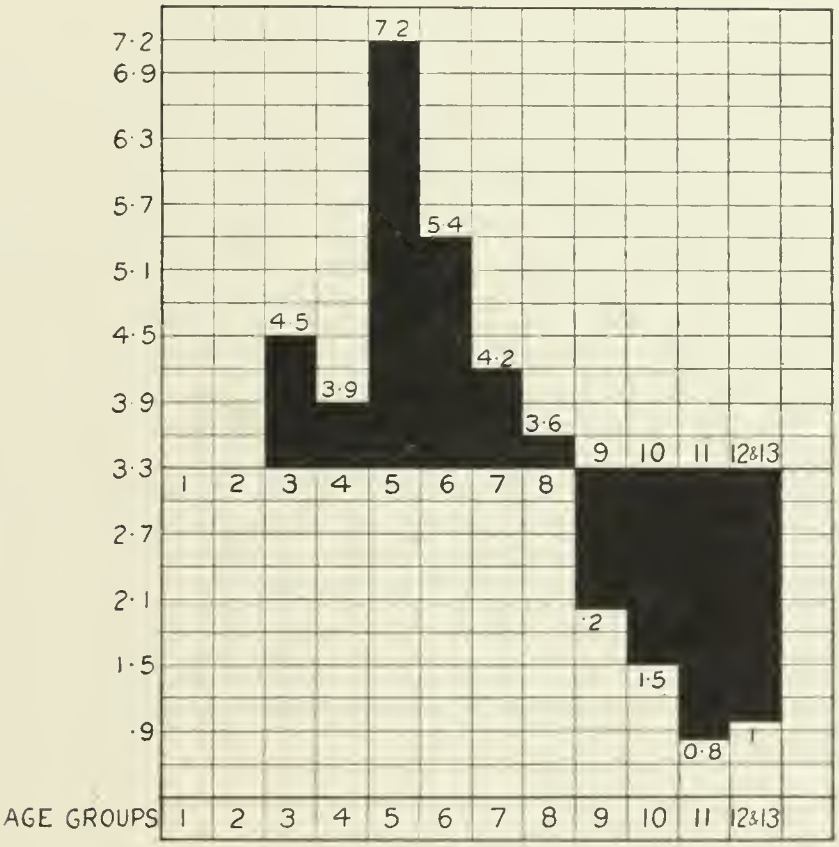


FIG. 3.

Percentage incidence of diphtheria in five schools, A—E.

TABLE VII.

Age distribution	Total school population	Total diphtheria cases	Percentage incidence
3 to 14 years	4,708	159	3·3
12 and 13 ,,	794	8	1·0
11 ,,	348	3	0·8
10 ,,	460	7	1·5
9 ,,	390	8	2·0
8 ,,	465	17	3·6
7 ,,	816	35	4·2
6 ,,	498	27	5·4
5 ,,	488	35	7·2
4 ,,	255	10	3·9
3 ,,	194	9	4·5

(7) Possible return of infectious cases from hospital; or more likely a possible recrudescence of infection after returning from hospital.

(8) Difficulty of obtaining certificates based on bacteriological analysis. Even these have been found unreliable.

(9) Great proportion of purely nasal carriers: possibly with membranous rhinitis, or merely scabs or excoriation round the nostrils.

(10) Difficulty of impressing on teachers the importance of excluding all cases of suspicion, and not readmitting them until a satisfactory investigation has been made.

In conclusion, what can be done for the chronic carriers of infection? We have seen how persistent the infection is and what little effect treatment has upon them. If the germ is a virulent one, it is clear that the best laid schemes of public health and education authorities will not prevent the occurrence and recurrence of cases of diphtheria. All manner of means have no doubt been tried to render carriers harmless, such as disinfectants, antitoxin, antidiphtheritic serum, autogenous diphtheria vaccines [3], improved conditions of health such as change of air, feeding. On the surgical side removal of unhealthy growths and enucleation of tonsillar matter have proved successful in some cases only. It is, therefore, clear that the means of treatment at present available are disappointing. Any new suggestions should, therefore, be put to the test. A method of treatment suggested by Schiotz [10], of Copenhagen, and subsequently tried in America [1], is one which appears hopeful, and could be tried on selected cases. A twenty-four-hour broth culture of *Staphylococcus aureus* is applied two to three times daily to the throat and nose in the form of a spray.

REFERENCES.

[1] Catlin, Scott, and Day. (*a*) *Journ. Amer. Med. Assoc.*, Chicago, 1911, lvii, p. 1452: (*b*) de Witt, Lydia, *Journ. of Infect. Dis.*, Chicago, 1912, x, pp. 24-35.

[2] Corbett. *Journ. of Hygiene*, Camb., 1901, i, pp. 235-59.

[3] Forbes, Duncan, and Newsholme, H. P. *Lancet*, 1912, i, p. 292.

[4] Graham-Smith. *Journ. of Hygiene*, 1902, ii, pp. 170-93; 1904, iv, pp. 258-327; and "The Bacteriology of Diphtheria," Camb., 1908 (Nuttall and Graham-Smith).

[5] Hamer, W. H. "Diphtheria in Lewisham," November, 1896, London County Council, "Annual Report of Medical Officer of Health, 1896," Appendices ii, iii.

[6] Murphy, Sir Shirley. (*a*) "Preliminary Memorandum by the Medical Officer (L.C C.) on the Increase of Diphtheria in London" (March, 1894), pp. 1, 5; (*b*) "Diphtheria and Elementary Schools," July, 1898.

[7] Newsholme, A. "The Epidemiology of Diphtheria" in "The Bacteriology of Diphtheria," 1908 (Nuttall and Graham-Smith).

[8] Porter, A. E. *Public Health*, 1912, xxv, pp. 224-31

[9] Power, W. H. Local Government Board (Report of Medical Officer), 1882, p. 52: 1883, p. 42; Thorne, R. Thorne, "Diphtheria" (Milroy Lectures), 1891; Murphy, Sir Shirley, *Public Health*, 1891-92, iv, pp. 71, 72.

[10] Schiotz, A. (*a*) "Cure of Chronic Diphtheria Bacillus Carriers," in "Uskadeliggorelse af Infectionsbaerere ved Difteri," 1910; (*b*) *Journ. Amer. Med. Assoc.*, 1912, lviii, p. 122, gives a short summary of (*a*).

[11] Thomas, C. J. (*a*) "Report of School Medical Officer (L.C.C.), 1904"; (*b*) *Brit. Med. Journ.*, 1904, ii, p. 431.

DISCUSSION.

The PRESIDENT (Dr. W. H. Hamer) said it was now thirty-seven years since Mr. Power wrote his report on diphtheria at Brailes, a report which, as the reader of the paper would say, possessed a certain amount of interest, even in these bacteriological days. It was printed by the Local Government Board, but was not easily accessible, as it was not reproduced in the Annual Report of the Medical Officer of the Board. It was succeeded, however, by the classical report on diphtheria at Pirbright. These reports first called attention to the importance of school influence. Nineteen years ago Sir Shirley Murphy first tackled the question of the statistics of diphtheria in big urban communities. Sir William Power was not present, but, fortunately, Sir Shirley Murphy was, and he would ask him to open the discussion.

Sir SHIRLEY MURPHY desired first to say a word as to the value of Dr. Brincker's paper. He regarded it as a most excellent statement of the behaviour of diphtheria. The author had treated the subject in a very judicial way, and his method of examination of the facts had conveyed an important lesson. With regard to Dr. Brincker's quotation from his (Sir Shirley's) reports a number of years ago, as to the alteration of the age-incidence of diphtheria coinciding with the passing of the Elementary Education Act, since that was written he had had, of course, the opportunity of working at the subject further, and six years ago he gave a paper to the Epidemiological Society,[1] in which he submitted a further explanation of that coincidence. The change in the age-incidence he regarded as due, in the main, to a variation in the infectivity of the disease. There seemed good reason for thinking this variation was cyclical, and that, apart from the Elementary Education Act, there would have been an increase in the diphtheria mortality at school age. Naturally, the more children were congregated in school, the greater would this increased infectivity be manifested. He regarded this change of infectivity as a greater factor than the passing of the Education Act. The study of the change of age-incidence was a most important one in watching over the diphtheria of a district. Dr. Brincker had told of cases bearing no conspicuous sign of the disease. So there might be cases in a locality not associated with any recognized cases in the same class-room, but infected at school; and the test as to whether the school was doing mischief was the test of the age-incidence of the cases. When he had the pleasure of working with Dr. Hamer at the London County Council, if there was an increase of diphtheria in a locality, the first thing they did was to take out the ages of the children attacked, and finding that the result suggested that infection at school was operative, they at once pointed out the need for further inquiry into that question. Dr. Brincker's statement about the growth of diphtheria in a locality was of much interest. He had himself watched it many times in Lewisham, Woolwich, and other places. The schools were not, at the time, openly accused of causing the mischief. Perhaps if one came to look at the relationships in the school of the children who were being attacked, one did not find it was an intimate one: the fact being that the infections were due to unrecognized cases in different classes. With regard to the question whether, with the bacteriological methods now possessed, the prevalence of diphtheria could be controlled, the effect of the author's statement seemed to be that this method often failed. It was hoped knowledge would advance, but it seemed to come to this at present, that when there was persistent diphtheria in a locality in which a school was involved, the only thing to be done was to close the school. It did not seem that one could always rely on the bacteriological method as a sufficient way of dealing with the matter. With regard to the effect of schools in disseminating diphtheria, he had many times referred, in his annual reports, to the marked depression in the seasonal curve of cases of diphtheria in the holiday month of August. Two objections had been taken to the hypothesis that it was due to cessation of infection at school: First, that it was due to the exodus of children from London in August. To that there was a complete answer in the curve which Dr. Newsholme published in his return, showing the cases of notified infectious disease in the whole country. When the whole of the cases were plotted out it was found that the August depression in the curve was pronounced. So if it was a question of exodus from London it must be exodus from England. The second objection was that the cessation of notifications in August was largely due to the cessation of observation on the part of school officers. But to that also there was a complete answer, for the annual summary of the Registrar-General for 1910, based upon deaths, showed the same depression occurring a little later, just as deaths occurred later than attacks. Whatever influence cessation of observation could have had on the curve of notifications, it could not have influenced the curve of deaths. He was convinced with the author that the great work in regard to diphtheria in urban localities was to consider its aspect in relation to schools.

---

[1] *Trans. Epid. Soc. Lond.*, 1906-07, n.s. xxvi, pp. 99-109.

Dr. W. G. SAVAGE also expressed his appreciation of the valuable paper. One impression from it was that if bacteriological methods were to be applied, they must be carried out thoroughly. That was all the more necessary as every now and then people were found willing to disparage bacteriological methods in diphtheria, and to prefer epidemiological methods, though he had never satisfied himself that they had applied bacteriology thoroughly. The nose as well as the throat must be swabbed, as the author pointed out. He was glad to see the importance of a general study of the incidence emphasized as required before the application of bacteriological methods. It was very important that all suspicious cases should be followed up, and in rural and semi-urban districts the advantages of a school nurse for that purpose were great. In several small districts in Somerset where there was diphtheria they had only been able to grapple with it when, on his advice, the services of a trained nurse were obtained to follow up every case of suspicious illness, and report them for bacteriological examination. With regard to the expedient of closing the schools, that might be necessary, but in regard to diphtheria it should not be indiscriminately resorted to, because the school formed a convenient centre for investigation. In rural districts closure of the school because of a few cases of diphtheria might be actually disastrous owing to the greater opportunities enjoyed from playing more freely together out of school. He had several times found that when an outbreak was diminishing one could often judge that it was so diminishing by the fact that the children no longer were chiefly attacked, but there was a high proportion of cases amongst adults. He had noticed the same fact also in scarlet fever. He had no explanation to offer. It could not be due to exhaustion of material, because, as a rule, only a small proportion of the possible cases had been affected. A further point brought out in the paper was what he might express as the short striking distance of diphtheria. It would be noticed in the paper read how frequently the associated cases were confined to classes; they were not scattered through the school. It was important to remember this fact when opposition to bacteriological methods was put forward on the ground that all the children in the school could not be swabbed, therefore what was the good of trying to control the disease by bacteriological methods? The answer was that it was the children sitting near the infected child, and the home contacts which needed bacteriological investigation. If they were very carefully watched and promptly examined much could be done to prevent an outbreak of diphtheria in the locality. He could say that after ten years' experience of bacteriological methods. The author of the paper had referred to the difficulty of dealing with persons harbouring diphtheria bacilli, and the impossibility of artificially hastening the elimination of those bacilli. It was a great problem how to deal with these contacts; the law did not provide for them or recognize their existence. An alteration in the law to include carriers was most urgently required. When he had charge of a fever hospital he tried all sorts of measures to get rid of the bacilli, but he never satisfied himself that his measures hastened their disappearance, apart from one instance in which he removed greatly enlarged tonsils, a proceeding which cut short the infectivity of a case which had lasted for months. From the removed tonsils he was able to cultivate the bacillus from one of the crypts, at least one-third of an inch from the mouth. He also demonstrated the bacilli in the tissue well away from the lumen of the crypt. If anyone could come forward with a reliable means of getting rid of the bacilli from carrier cases, he would do much to assist in the prevention of this disease.

Dr. DAVIES also desired to thank Dr. Brincker for his paper, the careful records of which would be useful to members in the future. He had been disappointed with routine swabbing as he had carried it out in Woolwich. He agreed, generally speaking, with what had been said about neglecting Hoffmann's bacillus, but one of the author's own cases showed the desirability of not neglecting it altogether. Where on one occasion the case was reported with Klebs-Loeffler bacillus, the next fortnight with Hoffmann's bacillus, and a fortnight later again with Klebs-Loeffler—not both together on any occasion—it was suspicious; it looked as if Hoffmann's bacillus had been mistaken for the

Klebs-Loeffler. In regard to the sentence, "It appears as if an increased liability for harbouring the bacillus of diphtheria was directly associated with a decreased susceptibility to an attack of diphtheria" (p. 92), should not that be a *severe* attack of diphtheria? The author seemed to think that the disease prevailed more in the better-class districts of London, but in making such comparisons one must be quite clear what one meant by diphtheria; did it mean mortality, or cases? On examination, differences might be found largely to disappear. If notified cases were meant, probably Dr. Brincker was right, but not deaths, because on looking at the Registrar-General's returns, 1906-10, he found that the four boroughs with the highest mortality from diphtheria were Fulham, Stepney, Finsbury, and Poplar, three of which were admittedly not the cleanest or richest boroughs in London. The notifications depended largely on the activity of the particular Medical Officer of Health and certain other persons. His impression had at first been the same as Dr. Brincker's, that the disease attacked mostly the better-class schools, but after a series of years he found it was not so altogether. He noticed that the children in the district of the poorer schools got mild forms of the disease, often not notified before school age, to a larger extent than was the case in the districts of the better schools, therefore the poorer schools were better protected against an attack than the better ones. Still, there might be a good deal in the suggestion that the staphylococcus exerted a satisfactory effect on the diphtheria germs. There had just been an epidemic of diphtheria in Woolwich, and in the last five months 279 cases had been notified, but only twelve deaths, or 4 per cent. There were sixteen cases in August, forty-three in September, forty in October, fifty-five in November, eighty-nine in December, but so far this month only thirty-six. For several years in Woolwich it had been the practice to swab all home contacts of school age, and the swabbing was repeated every fortnight until a negative result ensued. Usually one had to be content with one negative result. So far as he knew, Woolwich was the only London borough in which the practice was carried out systematically; therefore it was very disappointing to find, after five or six years, that Woolwich still had more diphtheria notifications than most other London boroughs. For a month or two there was an extraordinary number of positive results in contacts who were mainly healthy: 245 contacts were examined by himself. During August, out of twenty, eight were positive; in September, four out of twenty-nine; in October, two out of fifty. In November, out of fifty swabs, fifteen were positive; in December, out of forty-nine, thirty were positive. He did not know what was the explanation of this great temporary susceptibility to become carriers of diphtheria bacilli. In January, on the other hand, out of thirty-nine cases swabbed, only three were positive. Out of sixty-two positives, thirteen had slight symptoms (he was not including enlarged tonsils), and forty-nine had no symptoms. Out of 162 negative cases, thirty-three had some symptoms, 129 had none. Only twenty-one had Hoffmann's bacillus present, which was much below the usual proportion. He had begun to wonder whether routine swabbing of school contacts was of value. It had been suggested that carrier cases, after a certain number of weeks, ceased to be virulent. He did not know what was meant there by "virulent," but it was shown that after a considerable time they could continue to infect other persons. His experience made him feel the extreme difficulty of dealing with the subject on bacteriological lines.

Dr. ARNOLD said he had listened to the paper with great interest. One point which always struck him in discussions in which bacteriological investigations were mentioned was that there was a distinct difference between the tone in which bacteriological diagnosis was spoken of, and that of diagnosis by other means. When one came to the case of tuberculosis, for instance, it was freely mentioned that the diagnosis was made by a physician of high standing, that various signs were obtained, and that therefore it was evident the case was one of tuberculosis. But when speaking of swabbing, as a rule nothing more was said, except that the result was either positive or negative. He referred to a statement by a man for whose experience and opinion he had great respect, who said he did not think anyone had a right to return a negative result without half an hour's careful examination of the film, and even then the tube should be re-examined the next day. No doubt he was right, from the bacteriologist's point of view, but when dealing with large outbreaks that standard could not be kept up. The result was that he looked upon a bacteriological return as one which was of assistance, but was not definite. He had just seen a fairly extensive outbreak of diphtheria, and one heard so often that outbreaks were spread in schools, that he would like to relate an experience he had had in the last twelve months. In a town of 170,000 inhabitants, and 9,000 acres in extent, during the first quarter of the year the number of positive swabs was 5 per cent. to 7 per cent. of those examined. It was a town in which swabbings were taken very freely. In the second quarter, the number increased considerably, but it did not attract any great attention. The positive swabs rose to 15 per cent. of those examined. In the third quarter, a very large number of cases occurred, but they were all mild throughout, and the case-mortality never rose. In fact, the death-rate for the whole year had been practically unaffected. In the third quarter the positive swabs were 21 per cent. of those examined. In the fourth quarter all the cases seemed to disappear rapidly. Eight hundred cases were notified in the year. But the cases occurred so uniformly over the whole borough that they might have been distributed with a pepper-box. School influence could not be traced. There were thirty-three schools in the borough, and here and there cases attending certain schools increased rapidly for a short period, but there was nothing more, and the disease remained of the mild type.

Dr. THOMAS said that formerly when he had considerable opportunity to become acquainted with the methods of spread of outbreaks of diphtheria his conclusion was that the detection of the bacillus, and the isolation of the child carrying it, was not everything in the cure of diphtheria. He had watched in a school, over long periods of time, children with virulent bacilli in their throats, and though they had been left in the school, nothing had happened beyond slight attacks of sore throat in children sitting on the same benches, or in close contact with them. There might be a few sore throats from which diphtheria could be cultivated in the week, and they would disappear for a time, but clinical diphtheria did not seem to break out. But if notification of these sore throats were adopted, there might be a larger apparent outbreak. Under other circumstances a carrier would produce a definite outbreak of the disease, with, perhaps, many deaths. It almost seemed as if people with mildly virulent diphtheria organisms in their throats should be encouraged to go about vaccinating and thus rendering immune their fellows, and safeguarding them against severe attacks of the disease. The question of what to do with a person who was a persistent carrier was a very difficult one, but when there was an outbreak of clinical diphtheria, one must attempt to exclude from school and isolate, as far as possible, those who were found to be carrying the bacilli. When the outbreak had died down, one might be faced with four or five children who still proved to be carrying the disease. What should one do with them? Should they be allowed to go back to school? Certainly their virulence should be tested, and the child should not be kept away from school for a very long time simply because it had once proved to be carrying what was perhaps a non-virulent strain. He did not believe virulent strains turned into non-virulent, or vice versa, and he had found it safe to allow children carrying non-virulent organisms to return to school. Altogether, the question of control in diphtheria was a very difficult one, and it had certainly not yet been worked out.

The PRESIDENT said that after much anxious thought and consideration given to the subject, in conjunction with Dr. Brincker, during the past twelve months, the conviction was forced upon his mind that the verdict against "R. C.," the carrier in School F, was one of not proven. Conradi said carriers were deemed to be infective because they came from infected surroundings, and so "R. C." was deemed to be infective because she came from infected surroundings. But anyone who investigated the statistical probabilities, and considered from an epidemiological standpoint all the circumstances connected with "R. C.," apart altogether from any presuppositions based upon bacteriological hypothesis, would be driven to the conclusion that hers was not a clear case. Kirchner, Conradi, and others, had suggested that the existence of the bacillus-carrier condition was evidence that the bacilli had ceased to be infective; and if one approached "R. C.'s" history from this, rather than from the ordinary point of view, the facts must be deemed to be unconvincing. There seemed to him to be various considerations which made it necessary to review their position in regard to the whole question of chronic carriers. There were the following sets of facts. It was now transpiring that the general population was affected with the bacillus-carrying propensity to a far greater extent than was formerly supposed; then there was the further fact that "enrichment methods" had been discovered by which bacilli could, it was claimed, be demonstrated at least twice as often as by other methods.

There was, moreover, the fact that experts like Dr. Brincker, using all their skill and ability in dealing with these outbreaks, could not bring them to an end by the mere exclusion of bacillus carriers. It was further necessary to remember that there were various "strains" of bacilli, and there was the fact mentioned by Mr. Goadby, that bacteriologists now admitted the possibility that one strain of bacillus might be transformed into another. It was necessary to agree in the light of all these considerations with the view, expressed by Sir Shirley Murphy, Dr. Butler and Dr. Thomas, that the time had not yet arrived when it could be said that all the facts about diphtheria were clearly known.

Dr. J. T. C. NASH sent the following contribution: I propose to deal with one or two points only in connexion with the question of diphtheria in schools: (1) When a particular class or department suffers from recurrent attacks of diphtheria it is important, as I pointed out in my paper on "Scarlet Fever and Diphtheria from a Public Health Point of View,"[1] to include the teacher or teachers in the clinical and bacteriological investigations. I there related how an elementary school teacher—a visitor—had come under my observation as a diphtheria bacillus carrier, from whom I obtained a history that her infants' department had been in trouble with outbreaks of diphtheria for years in spite of long closure, frequent inspections, and swabbings of children, &c. The teacher had been suffering from a rhinitis for the same period, which had received much treatment, even from a specialist. It cleared up in a few weeks, after the administration of diphtheria antitoxin, a swab having revealed Klebs-Loeffler bacilli. Dr. Brincker mentions an interesting case of a class teacher at School E as a "carrier" without any clinical symptoms. This emphasizes the importance of not overlooking the teachers in connexion with school outbreaks. (2) Cases with enlarged tonsils and deep crypts are very prone to remain long infective. The bacilli lie deep and are untouched by antiseptic applications. In such cases I have found tonsillotomy the only resource before I could clear the throat of bacilli and discharge the patient. (3) Slight cases of nasal diphtheria are often the source of infection, and nasal inspection and swabbing are of equal importance with inspection and swabbing of throats. (4) Though as a rule *Staphylococcus aureus* appears to outgrow the diphtheria bacillus, I have known these organisms remain in intimate symbiotic relationship for days, as shown by throat swabbings. Schiotz's treatment is not a method I should feel justified in supporting except upon very strong evidence, and in any case I should be chary of spraying a large number of pyogenic organisms two or three times daily on to the mucous membranes of nose and throat. (5) The recrudescence of scarlet fever and diphtheria, or at any rate of infectivity, is well proved, and forms one of the problems so difficult to assess and anticipate. I have known infective properties recrudesce a year after an attack.

---

[1] *Practitioner*, Special Number, January, 1909.

Dr. BRINCKER, in reply, thanked the members for the way they had received his paper, and in particular he thanked Sir Shirley Murphy for his criticisms and expressed regret for not referring to his later paper. In this paper, read before the Epidemiological Society in 1900, Sir Shirley Murphy somewhat modified his opinion in regard to the importance of school attendance as an influence on the age-incidence of diphtheria.[1] But the latest statistics published by Dr. Newsholme in the Local Government Report tended to confirm the relationship of school influence and diphtheria. He continued as follows: Dr. Hamer maintains that the case against R. C. is *not proven*. This contention commands our very earnest attention, and brings us to the inevitable and only conclusion possible—namely, that whilst the science of bacteriology is yet in its infancy it is dangerous to dogmatize. Assuming, therefore, that the bacillus of diphtheria is a *sine qua non* in producing infection, it may well be asked why R. C. had not caused diphtheria amongst the occupants of her dormitory before she did; unless we assume that the *intermittency of infectivity*, or *germ latency*, can provide the explanation. But quite a new aspect now presents itself. Only a few nights ago in this very same room before the Pathological Section of this Society, Dr. Thiele and Dr. Embleton made public the results of their investigations. They claim that pathogenicity and virulence in regard to bacteria are questions of adjustment between the animal and the germ. It therefore seems difficult to believe that the bacillus of Klebs-Loeffler is *per se* the only factor in producing the clinical manifestations of the disease. Such divergent views are apt to influence our motives and objectives in the administrative control of infectious diseases; but the administrator would be ill advised at this point to allow speculative theories to exert too great an influence on the course he is to pursue. The plan we have always adopted was to regard all suspects as guilty until proved to be innocent. In this connexion the orthodoxy of the Public Health Department of the London County Council has been ably set before you to-night by Dr. Butler and Dr. Thomas. Mr. K. Goadby has referred to a paper read by him before the Epidemiological Society in 1899. This paper, "The Utility of Bacteriological Examination in a Diphtheria Epidemic in a School,"[2] 1898-1899, is the very first in the available literature in which the bacteriological methods are used to detect carrier cases: I regret having made no reference to him in my paper. I concur in Dr. Savage's views on the subject of school closure. In my opinion it should only be resorted to upon rare occasions, and then only after other and more comprehensive measures, such, for instance, as are mentioned in my paper, have failed to arrest the spread of the disease. By closing down schools we cut off the only field of investigation at our disposal, and in my opinion such a course is tantamount to a confession of failure. At this point attention should be drawn to two recent German papers. In the first, "On the Epidemiology and Means of Extermination of Diphtheria"[1] by Professor v. Drigalski, of Halle a/S., he shows how the incidence of diphtheria in Halle has been reduced by the very strictest exclusion of contacts and carrier cases. In the second paper, "Ueber Diphterie-bacillenträger in einem Kölner Schulbezirk,"[2] Dr. F. Schrammen shows that apparently no harm resulted from the retention of carrier cases in school. I note that Dr. Savage would welcome information as to the short striking distance of diphtheria. Although it is the practice in London schools to illustrate in diagrammatic form the relative positions of affected and suspected children in the class, it is very rare indeed to find a case confirming the short striking distance such as the one given under School E. The deduction is that diphtheria does not usually spread amongst those associated in class-rooms; cases usually appear in different class-rooms, or among children not apparently associated in the same class-room. Again, the lengthy period during which cases of diphtheria may recur in the same school or class, in spite of all precautions, is illustrated in the tables given in my paper in regard to Schools A and B. Dr. S. Davies still retains a secret respect for the bacillus of Hoffmann. Although Dr. Thiele states that he has succeeded in making the bacillus pathogenic to animals, he does not say that he has actually transformed it, morphologically and biochemically, into a typical Klebs-Loeffler bacillus. From an experience of many years I think we may safely neglect its presence. One of the chief objects of my paper was to direct your attention to the fact that a carrier case would not only not show, or discharge, Klebs-Loeffler bacilli over considerable periods of time, but that the same child may give both Hoffmann and a variety of strains of Klebs-Loeffler bacilli at the same time; and that of the latter class one colony would be virulent and the other non-virulent to animals. If, therefore, Hoffmann's bacillus is found on one occasion and Klebs-Loeffler on another, it does not follow that the one has in the intervening time been changed into the other: the only inference that should be drawn is that the bacillus of Klebs-Loeffler has not been found, or is for the time being not recoverable, from the throat or nose of the carrier. In this connexion I would draw your attention to Dr. Cartwright Wood's report on R. C. under School F.

---

[1] "Seasonal Variations in Age-distribution of Deaths from certain Infectious Diseases," Sir Shirley F. Murphy, *Trans. Epid. Soc. Lond.*, 1899-1900, xix, p. 205.

[2] *Trans. Epid. Soc. Lond.*, 1899-1900, xix, pp. 87-116.

I stated in my paper that diphtheria appears to adhere to the better housed and better cared for portion of a community. In this connexion I would draw your attention to the view held, namely, that diphtheria is associated with virgin and damp soils, especially when contaminated with organic matter, and is insufficiently drained. But whatever explanation is adopted, the general laws of epidemics, or such of them as are known, must be taken into consideration in dealing with any local outbreak. Communities have their cycles of immunity and epidemicity. During the last few years Woolwich, Greenwich and Lewisham, for example, have had an increased incidence per population of diphtheria. When the ascending wave of incidence reaches the crest in any locality then may we expect a decline in diphtheria incidence and deaths.

---

[1] *Centralbl. f. Bakt.*, 1912, Abt. i, Ref. Bd. 55, No. 4-5, p. 119.

[2] *Centralbl. f. Bakt.*, 1913, Abt. vi, Bd. 67, p. 423.

Diphtheria has been more or less epidemic along the Baltic coast during the past two years: both Amsterdam and Berlin have suffered very severely from outbreaks of diphtheria, and at the present time Amsterdam is in the throes of an epidemic of scarlet fever. Although London as a whole has been remarkably free from diphtheria during the last six years, we may yet in the immediate future have to contend with a very great and increased incidence of diphtheria.

I do not hold with Dr. Davies that mild cases *per se* are more infectious. I am inclined to state the case in another way—namely, that mild cases have greater and better opportunities for distributing the contagion, and those opportunities are greater in proportion to the amount of discharge, that is, in proportion to the chronicity of the condition. Chronic carrier cases of the kind I have described fortunately are rare, or bacteriology as a means of prevention would be of little use. The French method of quarantine over prolonged periods will then be the order of the day. Dr. Davies need not despair; bacteriology as a means of diagnosis and an aid to prevention is still of the very greatest help to us, but I would urge him to extend this test to all contacts and suspicious cases, whether they be children under school age or not, or adults outside school supervision. Of an infected household the younger would as a general rule be the sufferers, the elder the carriers.

In conclusion, I wish to thank Sir Shirley Murphy, Dr. Hamer and Dr. Kerr for placing their writings at my disposal; Dr. Frederic Thomson for suggestions and reports on R. C. and E. M.; and Mr. Jemmett, of the Public Health Department of the London County Council, for his valuable assistance in compiling the statistical facts which I have been able to place before you to-night.

Section of Epidemiology and State Medicine.

February 28, 1913.

Dr. W. H. Hamer, President of the Section, in the Chair.

THE TITLE AND OBJECTS OF THE SECTION.

The President submitted the following resolutions for the approval of the meeting:—

(1) That the Title of the Section be changed from the "Epidemiological Section" to "The Section of Epidemiology and State Medicine."

(2) That the objects of the Section be defined as follows: "For the Investigation of Epidemic and Endemic Diseases in respect of the circumstances and conditions which favour, prevent, or are otherwise associated with their occurrence, their persistence, or their variations in type or character."

The resolutions were carried unanimously.

Measles.

By William Butler, M.B.

Measles has maintained an epidemic uniformity of type which is traceable through many centuries. Plague and typhus, leprosy and tubercle, syphilis and that intimate epidemiological associate of measles, small-pox, have all from one cause or another undergone the most profound epidemiological changes. But measles, so far as one can judge, has undergone but little alteration in its epidemic and clinical features from the time when the Arabian physicians noted the natural and apparently permanent characters of the disease. It is a chastening thought that the epidemiologist may to-day study at first hand the natural behaviour of this ancient disease, with the knowledge that its main features have remained unaltered by art or science or the cosmic changes which the centuries have brought since first it was described.

The constant association, in the works of medical writers, of measles and small-pox rests, doubtless, less upon the literary tradition than upon the natural analogies of these diseases. "The measles have a great affinity with the small-pox."[1] "The measles have been considered by authors to have much resemblance to the small-pox, and I am of opinion they bear a striking resemblance in many of their phenomena."[2] The popular assertion that everyone must have measles was held to be true of small-pox, with an equal degree of probability, in those pre-vaccination days when small-pox ran its natural course.

The Arabian physician, Rhazes, in his treatise on the small-pox and measles, devotes what in the modern publication of the translated manuscript has become a chapter, to "the causes of the small-pox; and how it comes to pass that hardly anyone escapes the disease." This is the feature which naturally small-pox shares with measles, and which, with the possible exception of whooping-cough, is, to the same extent, true of no other disease. Unmodified by intentional interference or exceptional natural conditions, it is probably true not only that hardly anyone escapes these diseases, but that few survive childhood without having undergone what in effect is found to be a protective attack. The differential diagnosis of the two diseases, which to this day are not infrequently mistaken the one for the other, had been elaborated by the Arabian physicians. The following descriptions quoted from Rhazes will be recognized as mainly accurate more than one thousand years after the observations were made.

---

[1] "Of the Measles," the Medical Works of Richard Mead, M.D. Lond., 1762.

[2] "Of the Epidemic Measles of 1808," by Dr. Ferguson, *Med. and Phys. Journ.*, Lond., 1809, p. 359.

"The small-pox and measles are preceded by an acute fever, with violent pain and heaviness of the head, redness of the face, cough, dryness of the tongue and saliva; the veins of the face are swollen and inflated; the saliva is thick and viscid; and there comes on an itching of the nose, sneezing, redness of the eyes, with itching and a flow of tears, and puffiness of the face. The breathing is impeded, and there is disturbance of the mind, vomiting, loss of appetite, and a feeling of heaviness in the whole body. When you see these symptoms, or part of them, the small-pox or the measles will certainly appear, and sometimes when they appear the fever is obstinate, and the disease is more violent and difficult to treat; and at other times when they appear the fever is diminished: the measles are less elevated than the small-pox"[1] (p. 127).

"Sometimes the small-pox sinks inwards and is so like the measles that it is afterwards said that the measles are turned into small-pox. The difference between the two I have found to be, that the measles are red, and appear only on the surface of the skin, without rising above it, while the small-pox consists of round eminences. When these eminences appear, fix your attention on them, and if you are in doubt as to the disease, do not express any opinion about it for a day or two; but when there are no eminences, you must not give as your opinion that the disease is the small-pox"[2] (p. 113).

". . . the inquietude, nausea and anxiety are more frequent in the measles than in the small-pox; while on the other hand, the pain in the back is more peculiar to the small-pox than to the measles"[3] (p. 34).

". . . The bowels are generally relaxed in the small-pox and measles towards their decline, and especially in the measles; for which reason, after these diseases have passed their crisis, everything must be avoided which opens the bowels, even if they should be confined"[4] (p. 67).

"The fever attending the small-pox is a continued fever, and for the most part attacks children. . . . The eruption generally appears on the third day from the beginning of the fever, but sometimes on the first or second day. One of the most favourable symptoms is the appearance of the eruption on the third day, or at the time when the fever is mild"[1] (p. 104).

---

[1] Rhazes on "The Small-pox and Measles," The Sydenham Society, Lond., 1848.

[2] *Ibid.*

[3] *Ibid.*

[4] *Ibid.*

The quotation may appropriately be concluded by the following, from which it may be seen how much the medicine of the tenth and of the twentieth centuries have in common.

"Modern physicians are accustomed to give to drink butter-milk from which the butter has been removed"[2] (p. 105).

THE UNIVERSAL EPIDEMICITY OF MEASLES.

I have referred to the popular assertion that everyone must have measles, but the truth of this may well be questioned, or if admitted, with Rhazes we may inquire, as he did of small-pox, into the cause of measles, and "how it comes to pass that hardly anyone escapes the disease."

First of all, then, is it true that hardly anyone escapes the disease? During a number of years I have made very careful inquiries into the history as regards previous attacks by measles of persons exposed intimately to the infection, and by continued observation have ascertained whether such persons subsequently contracted the disease. The results are set out in the subjoined table, and if the 14,000 persons observed may be taken as typical of their class, the answer, so far as this class of persons is concerned, is in the affirmative.

TABLE I.—WILLESDEN.

Table showing as a result of nearly 14,000 persons observed the proportion who at different age periods had already suffered from a previous attack of measles.

Ages	Number observed	Number previously suffered	Number not previously suffered	Percentage previously suffered	Percentage not previously suffered
0-4	1,956	161	1,792	8·4	91·6
4-5	451	135	316	29·9	70·1
5-6	327	155	172	47·4	52·6
6-7	351	248	103	70·7	29·3
7-8	497	372	125	74·8	25·2
8-9	514	426	88	82·9	17·1
9-10	530	462	68	87·2	12·8
10-15	2,100	1,899	201	90·4	9·6
15-	7,255	7,061	194	97·3	2·7
Total	13,981	10,922	3,059	78·1	21·9

---

[1] Rhazes on "The Small-pox and Measles," The Sydenham Society, Lond., 1848.

[2] *Ibid.*

Of the approximately 14,000 persons observed, no fewer than 78 per cent. at all ages had previously suffered an attack of measles. Analysed into age-groups, the results are yet more striking. Whereas of the age-group 0-4 it was ascertained that only 8·4 per cent. of the children had already undergone an attack of measles, no fewer than 97·3 per cent. of persons of the age-group 15 and upwards had previously suffered from the disease, while at each year of age between these age-groups the percentage with a history of previous attack rose steadily and rapidly. A check upon the accuracy of the history was afforded in the subsequent observation of the cases investigated. All of the 14,000 cases were persons living in the same house with actual cases of measles, and were as stated continued to be observed until the period had expired when they were liable to show evidence of having contracted the disease. The results of these observations are set out in Table II, p. 124.

From this table it will be seen that in the group of contacts at all ages stated not previously to have been attacked by measles, 66·1 per cent., as contrasted with only 0·7 per cent. in the group stated previously to have been attacked, developed the disease as a result of contact with the cases in their homes. The distribution of these cases according to age is exceedingly interesting, but before considering this the point to which I wish to draw attention is the confirmation which the figures furnish of the approximate accuracy of the history given as to previous attack. It is to be noted that the statement as to previous attack was recorded prior to the subsequent development or otherwise of the attack of measles resulting from contact with a case in the dwelling-house. If the 14,000 cases may be taken as a random sample of the population in England, they show that among persons who have attained the age of 15 and upwards only 2·7 per cent. have escaped attack by measles. For the class of persons investigated it is probable that this figure is characteristic. The work was carried out in connexion with public elementary schools in Willesden; and Willesden, a suburban district of rapid and recent growth, drawing its population from all parts of the country, is probably, so far as its public elementary school class of population is concerned, quite as typical as any sample could be of this class of population throughout the country. It would be an error, however, to assume that, because all but 2½ per cent. of the public elementary school class of the population had undergone attack by measles before reaching the age of 15, therefore all classes in the community suffered to a like extent. The experience of several of our public schools and cadet training colleges in recent years, in fact, suggests that among the more favoured classes of the community measles is less a necessary experience in the earlier years of life than is the case among the masses of the population.

TABLE II.—WILLESDEN.

Table showing the incidence of measles upon persons definitely exposed to infection, distributed according to age and history of previous attack.

Contacts stated not previously to have suffered.

Age periods	1908-11		
	Number of contacts in house	Number of contacts attacked	Percentage attacked
0-6 months	174*	18*	10·2
6-12 ,,	209*	161	77·0
1-2 years	242†	204†	81·3†
2-3 ,,	248†	221†	89·1†
3-4 ,,	323†	291†	90·1†
0-4 ,,	*1,792*	*1,391*	*77·6*
4-5 ,,	316	263	83·2
5-6 ,,	172	124	72·1
6-7 ,,	103	67	65·0
7-8 ,,	125	65	52·0
8-9 ,,	88	39	44·3
9-10 ,,	68	29	42·6
10-15 ,,	201	37	18·4
15 years and upwards	194	8	4·1
Total	*3,059*	*2,023*	*66·1*

Contacts stated previously to have suffered.

Age periods	Number of contacts in house	Number of contacts attacked	Percentage attacked
0-6 months	1*	—	—
6-12 ,,	1*	—	—
1-2 years	6	2	33·3
2-3 ,,	15	1	6·7
3-4 ,,	32	7	21·9
0-4 ,,	*164*	*17*	*10·4*
4-5 ,,	135	14	10·4
5-6 ,,	155	6	3·9
6-7 ,,	248	4	1·6
7-8 ,,	372	8	2·2
8-9 ,,	426	10	2·3
9-10 ,,	462	3	0·6
10-15 ,,	1,899	10	0·5
15 years and upwards	7,061	4	0·1
Total	*10,922*	*76*	*0·7*

* 1909 and 1910-11 only. † 1910 and 1911 only.

I am indebted to Dr. Tubb-Thomas, the Medical Officer of Health of Wiltshire, for the following facts relating to the recent outbreak of measles at Marlborough College. Of 632 boarders in the school, no fewer than 190 between the ages of 13 and 17 were attacked. This incidence-rate of 30 per cent. at the ages of 13 to 17 has to be contrasted with an incidence-rate of 2·2 per cent. of the public elementary school class between the ages of 10 and 15 under conditions of direct exposure. There were, moreover, in the school no fewer than 217 boys, or 34·3 per cent. of all the boarders, who had not previously suffered an attack of measles. Among the public elementary school class at the age-period 10 to 15, only 9·6 per cent. were found not previously to have been attacked by measles. Most striking of all is the fact that, of the 217 boys between the ages of 13 and 17 who had not previously suffered, no fewer than 181, or 83·4 per cent., were attacked with the disease. This 83·4 per cent. contrasts with the 18·4 per cent. of the public elementary school class of children who had not previously suffered of the age-period 10-15, who, when exposed to infection, alone contracted the disease. Curiously, of the 415 boys who were stated previously to have suffered from measles, 9 were attacked for a second time. This gives an attack rate of about 2 per cent. as contrasted with an attack rate of 0·5 per cent. in the previously suffered public elementary school class of the age-period 10-15.

TABLE III.

Table showing an analysis of the attacks of measles in a Public School in Wiltshire, 1912.

Boys in school	Number	Number attacked	Percentage attacked
Total boarders...	632	190	30·0
Stated previously to have suffered ...	415	9	2·16
Stated previously not to have suffered ...	217	181	83·4

Table showing number attacked at each year of age.

Age	Number attacked
13	15
14	53
15	67
16	40
17	15
Total ...	190

The explanation of the contrast in the behaviour of the public school and public elementary school classes of children when exposed to infection of measles, I shall return to later. But it may be here stated that the more careful fostering and lesser gregariousness of the public school class at the more tender age-periods means lessened risk of exposure to infection, and the delayed attacks mean probably only delayed opportunity of becoming infected.

The facts so far as this country is concerned appear to be that by far the greater proportion of the population undergoes attack by measles in childhood, and that for the most part this attack confers immunity throughout life. Certain classes in the community, probably as a result of greater fostering, escape during childhood, and these when exposed are found to suffer a greater degree of incidence at higher age-periods. In public elementary schools measles is a disease of the infants' departments, the older children escaping anything like epidemic outbreaks. In this the senior departments of public elementary schools contrast with the experience of public schools. A curious feature of the figures in Table II is the apparent decline in susceptibility with each successive year of life in children aged over 5. In part this is doubtless due to the fact that as children grow older they acquire an increasing degree of immunity to attack, just as with increasing age they are more resistant to the disease when attacked by measles or whooping-cough, as shown in the lessened fatality rates at the higher ages. The figures in Table II are not compatible with the experience of measles outbreaks of the kind with which we are familiar in public schools; they are in extreme contrast with the accounts we have of epidemics occurring in isolated communities protected by their isolation for prolonged intervals from epidemic recurrences of the disease. The immunity apparently acquired by increasing years entirely disappears in these circumstances. The explanation of the rapid decline in susceptibility *pari passu* with increasing years, apparent in the table, is probably that it is only in small part due to increasing immunity conferred by age, and mainly to the fact that where the risks of exposure to infection are so great as is usually the case with measles, the persons who survive each year of life without attack are increasingly those naturally selected persons whose innate immunity to the disease is abnormally great.

Contrasted with a population such as that of the South Sea Islands or of the Faröe Islands, or even with the specially protected more favoured classes of this country, the persons who survive to 16 years of age, say, without attack are for the most part the naturally immune. They have run the gauntlet of infection with impunity, and when exposed afresh exhibit again the insusceptibility which has already served them and which accounts for their not having previously suffered. It is quite otherwise with those who attain to adult age without ever having been exposed to measles infection. They, when exposed for the first time, succumb to the disease irrespectively of age. There is, in fact, no selective age-incidence to be observed in a community subject only at long intervals to outbreaks of measles. This suggests the further view that not age, *per se*, but the opportunity which it confers of acquiring an active immunity through exposure to attenuated or minor doses of infection brings about the changes in susceptibility exhibited in the table. But whatever be the explanation, the widest ranges both in natural and in acquired immunity are exhibited under identical conditions of exposure to infection in the population of the public elementary school class in this country directly as a result of distributing it according to its age constitution. Not the least remarkable of these variations is that to be observed during the first year of life. It will be observed that of 174 infants under 6 months of age in houses invaded by measles only eighteen or 10·2 per cent. failed of the disease, whereas of 209 between 6 and 12 months of age no fewer than 161 or 77 per cent. contracted the disease. To what is this congenital immunity which practically disappears after the first six months of life due? It is not limited to measles, though, owing to the high infectivity of this disease, it is most readily demonstrated by a differential analysis of the ages of measles contacts. I have endeavoured to ascertain whether it were correlated to breast-feeding, but the data were inconclusive. It is probable that the protection is a maternal derivative, but to whatever it be due it is worthy of further investigation. The insusceptibility of very young children to measles is not a new observation. Thus Holt [1] says: "Very young children do not readily contract measles, but all other children are extremely susceptible. The disease broke out in a cottage of the New York Infant Asylum, which was occupied by twenty-three children, nearly all of them being under 2 years old; only four escaped, all these being under 5 months old. . . . In the Nursery and Child's Hospital during the epidemic of 1892. . . . there were in the institution 113 children under 2 years old; of this number 78 per cent. took the disease; but although a number were exposed, not one child under six months old contracted measles." The intimate relationship of the immunity or otherwise of the infant to the degree of susceptibility of the mother is further shown by the fact that cases have been recorded in which, when the mother has herself been suffering from measles, the infant has been born with the rash, or has developed it within a few hours of birth. Dr. Ferguson, writing of an epidemic of measles occurring in 1808, remarks that "children who were sucking had the disease less violent than those who were between 20 months and 3 years of age."[1] If only the condition on which the congenital immunity of infants depends could be sufficiently understood to enable it to be made permanent, one of the most important problems in preventive medicine would be solved. Although for practical purposes this immunity has disappeared in the second six months of life, it is still traceable, while the greatest susceptibility appears to be attained in the third and fourth years.

---

[1] "Diseases of Infancy and Childhood," New York, 1913.

These figures, as I have said, are in contrast to what is found when measles breaks out in what may be described as virgin soil. The analogy to small-pox is maintained in a respect which could not have been known to the older observers. Measles, except in the case of isolated populations, is a disease of childhood, attacking during the first decade of life by far the greater number of persons living at that age-period. In this it resembles small-pox in its natural incidence upon a population in which the children are unprotected by the induced immunity of vaccination. When a population is protected by its isolation from contact with measles for a sufficient period to enable its members to attain maturity without having been exposed to infection, if the disease is introduced, it becomes epidemic no longer solely among the children, but attacks, apparently indiscriminately, persons of all ages. Small-pox, normally a disease of childhood, becomes a disease of adults who have outgrown their protection, as we have seen it in vaccination times. Measles, a children's disease when only the children are unprotected, becomes equally a disease of adults when the adult population has failed to acquire the immunity conferred by previous attack. The analogy is even closer when, among an unvaccinated community which has been protected from small-pox by its isolation, the disease breaks out; as Creighton[2] points out in respect of the colonies, "it is as much an affair of adults as of the children." Perhaps two of the best illustrations of the truth of this statement as regards measles are the outbreaks that have occurred among the isolated island populations of Fiji and Faröe.

Taking first the Faröe Islands. From the year 1781 to the year 1846, the inhabitants appear to have been entirely free from measles. In the latter year, however, an epidemic broke out, and within six months nearly 6,000 of the 7,782 inhabitants were affected with the

[1] *Med. and Phys. Journ.*, xxi, Lond., 1809, p. 363.

[2] "History of Epidemics in Britain," 1894.

disease. Assuming that every inhabitant was exposed to infection, the attack-rate of 77 per cent. of persons at all ages is phenomenal. In Willesden, of 3,059 persons of all ages who had not previously suffered from the disease, living in the same houses with cases of measles, 2,023, or 66 per cent., were attacked, as shown in the table above. It is not a little remarkable that in a number of scattered islands when the disease broke out, it should exceed the incidence-rate observed among unprotected persons in England when brought into intimate exposure to infection. "It is a remarkable fact," says Dr. Panum,[1] "that of those now elderly people who in 1781 had had measles, not one individual was affected on the present occasion. Other aged persons who had not had measles during the epidemic of 1781 were as liable to the disorder on this occasion as were their juniors. Some young people, though perpetually exposed in the most complete manner to the contagion, never seemed capable of taking the disease."

The notorious outbreak in Fiji of 1875 appears to have been even more complete in the manner in which it attacked the whole of the inhabitants. In a contribution made to the Epidemiological Society in 1877 by Dr. William Squire, he says: "The epidemic only ceased when every person had been attacked." In three districts where a census had been taken before the epidemic, the loss since the introduction of measles was ascertained, and it was found that among a population of 12,014 there had occurred 3,349 deaths, a mortality equal to about 27 per cent. of the total population. Altogether, in about four months there occurred about 20,000 deaths, a loss estimated at from about a fourth to a fifth of the total native inhabitants. Dr. Squire adds: "The favourable progress of the early native cases negatives the idea of special proclivity. So during the worst of the epidemic, at places where the people, seized with fear, had abandoned their sick. . . . the fact of only one death occurring among a number of cases, treated in separate rooms with fair attention, is against any but a locally acquired intensity of the disease. . . . All the innate dangers of the disease here revealed differ only in degree and not in kind from those which are so commonly guarded against among ourselves by simple nursing."

There are numerous other instances of the wholesale manner in which, among uncivilized peoples, inexperienced in the disease, measles has spread with overwhelming and disastrous effect. It is estimated that no fewer than 30,000[2] natives died of the disease during an epidemic of measles in 1749 on the banks of the Amazon, whole tribes being stated to have perished. Similar experiences are recorded among the natives of Astoria, among the North American Indians, among the Hottentots, and the natives of Tasmania.

---

[1] *British and Foreign Med. Chir. Rev.*, 1851, vii, p. 428.

[2] Hirsch, "Geographical and Historical Pathology," 1883, i, p. 167.

One fact clearly emerges from an examination of these outbreaks. Natural immunity to measles is an exceptional condition. Whether it exists in higher degree among peoples more or less continuously subject to its epidemic prevalence, is at least doubtful. Certain it is that after congenital immunity has disappeared, the main protection at all subsequent ages is conferred by the "salting" process of an attack of the disease itself. This appears for the most part to be permanent. That only 0·7 per cent. of nearly 11,000 persons of all ages who were stated already to have suffered the disease should fail upon intimate exposure to infection, is in striking contrast to the facts observed in the epidemics in Faröe and Fiji, and affords the strongest proof of the persistency of the immunity conferred by an attack of measles.

Such being the normal condition of susceptibility to the disease, it may well be asked whether it is worth while attempting to avoid a disease so clearly marked out as the common lot of man. Nothing, however, is more striking than the variability of the disease in respect of mortality. The most marked differences both of general and of case mortality from the disease have been recorded in different epidemics. Among 8,167 cases which came to knowledge in Willesden, only 107 or 1·3 per cent. figured in the death returns as having succumbed to the disease. Of 6,000 persons estimated to have been attacked in the Faröe Islands, 102 died, giving a case mortality-rate of 1·7 per cent. These rates are low, even for fatality rates at all ages. Dr. Charles Creighton[1] attaches considerable importance to what, upon apparently insufficient data, he considers to be an increased mortality from measles in vaccination times. In what he describes as "one of the earliest and most memorable inquiries in vital statistics in this country," that of Dr. Robert Watt, of Glasgow, into the "Relative Mortality of the Principal Diseases of Children" (Glasgow, 1813), he cites as a witness to the change in mortality the following statement of Watt: "Children who had survived small-pox were fortified by this ordeal, not merely as selected lives, but positively fortified, so that measles, when it assailed them in due time afterwards, was taken mildly or was 'modified,' *not one in a hundred cases proving fatal.* But now (1813), when so few children have been through the small-pox, measles has become ten times more fatal to them, *although it could hardly be more common than it used to be.*" Here we are concerned rather with the fact than with the interesting theory propounded, and it is certainly important to have recorded by a reputable statistician that the fatality-rate from measles a century ago varied between 1 and 10 per cent. Compared with some of the death-rates in several of the epidemics referred to above, where whole families and tribes are stated to have been decimated, these rates are of modest dimensions.

---

[1] "History of Epidemics in Britain."

It is to be noted that nearly all fatality-rates from measles are necessarily subject to error, arising from the fact that not all the cases dying, more particularly from the pulmonary complications of the disease, are returned as deaths from measles. They appear in death returns as deaths from bronchitis or pneumonia, and whenever measles (and the same statement is true of whooping-cough) is epidemic the deaths ascribed to pulmonary affections invariably rise. Presumably this under-statement of the deaths due to measles is true of all outbreaks, except those occurring in institutions where the cases are under medical supervision throughout. It is probable that the deaths from measles are understated to a greater extent than those from whooping-cough. The evidences of measles disappear with the eruption, but those of whooping-cough obtrude themselves for weeks after the onset of the disease. This is doubtless in part the explanation of the following figures, which are an analysis of the returns of deaths from measles and whooping-cough in Willesden in respect of the period at which death occurred.

TABLE IV.—WILLESDEN.

Analysis of Deaths from Measles and Whooping-cough in relation to Period of Disease at which Death occurred.

MEASLES : Total deaths, 196.

Dying during first week		Dying during second week		Dying during third week		Dying during fourth week		Dying after fourth week	
Cases	Percentage of total	Cases	Percentage of total	Cases	Percentage of total	Cases	Percentage of total	Cases	Percentage of total
54	27·5	89	45·4	28	14·2	11	5·6	14	7·1

WHOOPING-COUGH : Total deaths, 187.

Dying during first week		Dying during second week		Dying during third week		Dying during fourth week		Dying after fourth week	
Cases	Percentage of total	Cases	Percentage of total	Cases	Percentage of total	Cases	Percentage of total	Cases	Percentage of total
18	9·6	48	25·6	38	20·3	37	19·8	46	24·5

For the reasons stated then, it may be assumed that the case mortality is higher than appears in all except institutional returns. This does not, however, account for the marked difference in the fatality rates observed in institutions, and among the general population under what may be described as the normal epidemicity of the disease. It has frequently been noted that institutions suffer an exceptionally severe case-mortality. In the Hospice des Enfants assistés in Paris, the average case mortality during four years was no less than 44 per cent.[1] In institutions in America it has been observed to range from 15 to 35 per cent.[2] In a small outbreak in a Poor Law infirmary at Willesden, the case mortality reached the high figure of 46 per cent. In two large hospitals during the American Civil War the mortality amounted to 20 per cent. of the sick.[3]

These high fatality-rates can only be paralleled among civilized peoples by outbreaks occurring among troops under war conditions. During the siege of Paris in 1871, out of 215 cases of measles occurring among the troops, eighty-six or 40 per cent. died. Nearly one-fifth of the national army of Paraguay is stated to have been carried off during an epidemic of measles, not from the severity of the disease, but from want of shelter and proper food."[4] Almost invariably where these high mortality figures are recorded it is stated that they were due not necessarily to the severity in type of the disease. What may be described as control observations upon cases treated and cared for privately during disastrous epidemics have shown that among these cases there was no abnormal fatality. Exposure, unsuitable or insufficient food, lack of nursing or medical care, overcrowding or other unfavourable hygienic circumstances are the conditions cited apparently with good ground as explanatory of high and exceptional mortality from measles. In institutional outbreaks of high fatality there are two circumstances which probably are accountable under conditions otherwise hygienic for the abnormal mortality. These are, first, the exceptionally low resisting power of certain institutional inmates—notably the children in Poor Law infirmaries—and secondly, the selection of cases which institutional treatment frequently implies, more particularly in the case of hospitals to which are removed the more severe and less favourable cases occurring under the worst home conditions. One circumstance, however, stands out above all others as influencing case mortality, and that is age-incidence. It seems clear that the younger the age at which a child is attacked the higher is the case mortality. Over 90 per cent. of the deaths occur in this country under five years of age, though it is probable that not half of the children who in the course of their lives will undergo attack have at this age-period suffered the disease. It is difficult to ascertain the normal fatality of the disease at each year of age, that observed in institutions being, as already stated, higher than occurs among the general population. The figures of the Hospice des Enfants assistés are as follows :—

---

[1] "Measles," Allbutt and Rolleston's "System of Medicine," 1906, ii, pt. i, p. 386.

[2] Holt, "Diseases of Infancy and Childhood," 4th ed., 1907, p. 990.

[3] Hirsch, "Handbook of Geographical and Historical Pathology," p. 168.

[4] *Ibid.*, loc. cit., p. 169.

TABLE V.—CASE-MORTALITY FROM MEASLES IN INSTITUTIONS.

Hospice des Enfants assistés.

0 to 6 months	23·7 per cent
6 ,, 12 months	57·8 ,,
1 ,, 2 years	53·9 ,,
2 ,, 3 ,, ...	27·7 ,,
3 ,, 4 ,, ...	13·7 ,,
4 ,, 5 ,, ...	6·2 ,,
5 ,, 10 ,, ...	2·4 ,,
10 ,, 21 ,, ...	0·0 ,,

Holt[1] gives an analysis of 143 cases occurring in an institution as follows :—

6 to 12 months	33 per cent.
1 ,, 2 years	50 ,,
2 ,, 3 ,, ...	30 ,,
3 ,, 4 ,, ...	14 ,,
4 ,, 5 ,, ...	0 ,,

The following table shows the fatality-rates as ascertained at Aberdeen during twenty years in which compulsory notification had obtained, compared with similar rates as ascertained in Willesden among cases coming to knowledge as a result of school notification. The Willesden figures relating to 6,278 cases are much smaller than those of Aberdeen, where in the twenty years over 40,000 cases were notified.

This higher mortality at the lower ages is a fact which has long been recognized as of the utmost importance. As we have seen, the prospects of avoiding permanently attack by measles are at present, except for a very small proportion of the population, exceedingly remote ; but we have also seen that for the more carefully nurtured classes it is possible to delay the age at which, in the ordinary course, exposure to infection takes place, and by so doing to reduce the mortality. What then are the main reasons of the spread of measles at the earlier ages among the masses of the population? The answer is undoubtedly to be found in the fact that the children of the less favoured classes commingle in larger numbers and at earlier ages than is the case with those whom measles attacks at a maturer age.

---

[1] "Diseases of Infancy and Childhood," 4th ed., 1907, p. 990.

TABLE VI.

Comparative case-mortality of measles at ages in Aberdeen and Willesden.

	ABERDEEN			WILLESDEN		
Age-periods	Cases	Deaths	Case-mortality per cent.	Cases	Deaths	Case-mortality per cent.
0—	3,034	426	13·9	322	9	2·8
1—	5,222	526	10·0	579	29	5·0
2—	5,195	178	3·4	670	20	3·0
3—	5,053	82	1·6	756	11	1·5
0–4	*18,504*	*1,212*	*6·5*	*2,327*	*69*	*3·0*
4—	4,836	43	·9	915	2	0·2
5 and upwards	*17,034*	*91*	*·5*	*3,036*	*10*	*0·3*
Total	40,374	1,346	3·3	6,278	81	1·3

Sir Shirley Murphy[1] has shown how, in the last half of the nineteenth century, there has been a definite shifting of the age-incidence of measles mortality in London, and gives the following figures as evidence of a remarkable epidemiological phenomenon:—

TABLE VII.—MEASLES: DEATHS ALL AGES, 1,000.

Years	0—	1—	2—	3—	4—	5—	10—	15—	20+
1851-60	162	366	219	116	62	63	5	2	5
1861-70	183	386	216	107	53	46	4	1	4
1871-80	213	393	184	97	50	55	3	1	4
1881-90	197	383	187	104	59	63	3	1	3
1891-1900	212	409	172	98	55	48	2	1	3
1901-1905	226	423	170	86	50	41	2	0	2

Sir Shirley Murphy adds: "This shifting of measles mortality on to the first two years of life is, no doubt, the result of increased aggregation of population in London and increased opportunity of infection, the result of aggregation of children in schools: for measles, in greater degree than scarlet fever or diphtheria, spreads in the home to the children of pre-school age if the disease be introduced into the home by a school-attending child."

---

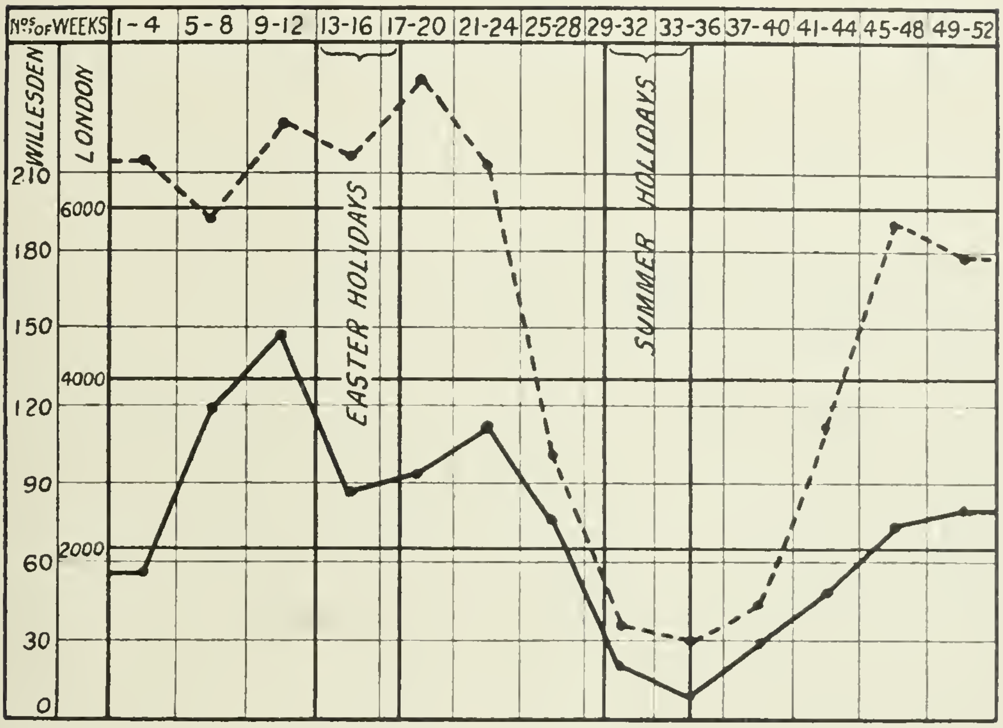
[1] Annual Report.

I found in Willesden, among the cases coming to knowledge directly or indirectly as a result of notifications from the public elementary schools, that over 70 per cent. were traceable to cases directly contracted in the Infants' Departments of these schools. As might be expected, having regard to the greater proportion of susceptible material, the younger the age at which children attended school the greater the proportion which was attacked by measles. In one year, for instance, I found that 40 per cent. of the scholars under four years of age enrolled in the public elementary schools contracted measles by school contact. Of those between 4 and 5, 23 per cent., and of those between 5 and 6, 11 per cent. were similarly attacked.

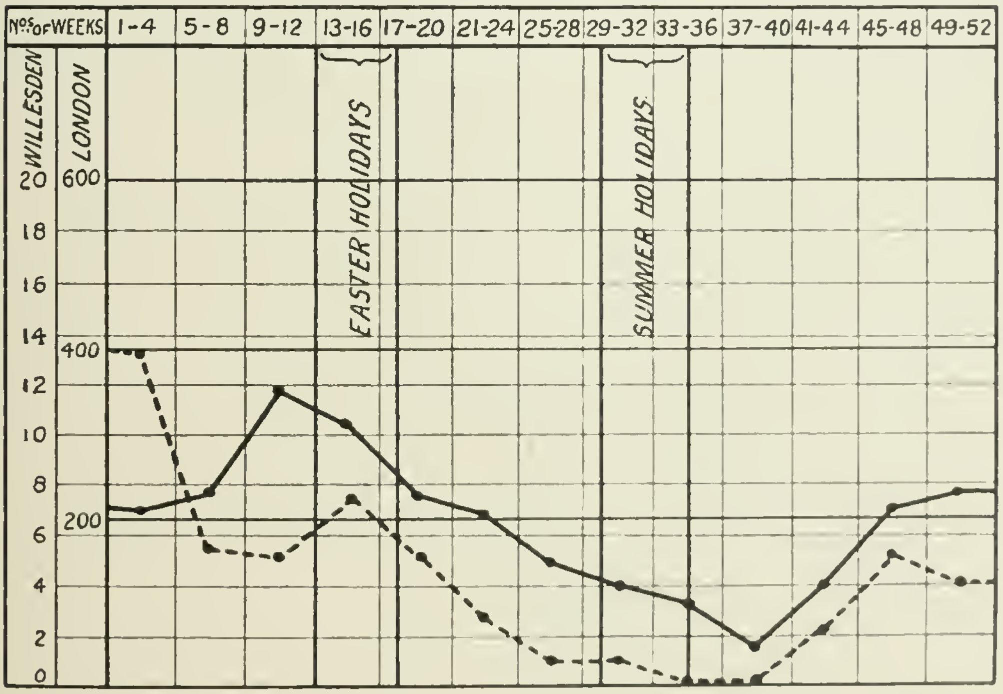
Delaying the age of commencing attendance at school would probably raise to a higher age the proportional incidence of measles, but even then not all the younger children would be protected from exposure to infection, since, assuming that delayed attendance at school were successful in warding off, in the case of the elder children in the family, attacks of measles to a later age, the full value of this would not be gained. For the children contracting the disease at school, as Sir Shirley Murphy points out, take it to their homes, and there infect all the members of the family who have not previously suffered, and thus a considerable proportion of very young children are affected. It is probably due to the fact that public school children in large measure undergo their attack at school where they are boarded and lodged, that the younger members of the families at home escape exposure to infection. Among this class of children the family risk from school-spread infection is practically *nil*, except in those cases of misguided interference where the school is dismissed during the period when those already exposed to the infection are incubating the disease. This device for diffusing infection among the scattered families which focus in a public school is fortunately not so common an occurrence as to prevent those wide differences of age-incidence which are apparent in the classes of children compared.

So far as public elementary schools are concerned, efforts to stay the spread of measles by early exclusion and school closure, which are the methods at present available, are frequently attended with success if, under a properly organized system, they are put into prompt execution at the beginning of school outbreaks. Frequently by the closure of an infants' school upon the occurrence of a first case, or even of a first crop of cases, I have been able to ascertain that the resulting cases have occurred during the period of school closure, and that upon the re-opening of the school no further spread of the disease has occurred, notwithstanding that many susceptible children were thus protected from exposure to infection. It is improbable that by these measures more will be accomplished than a slight raising of the average age at which children contract the disease. But this will mean a reduced mortality, which is the first object to be aimed at, and seems not unattainable. The high mortality, of which examples have been given, which attends neglectful or mistaken and ignorant treatment is another remediable condition which is slowly being removed as a result of widespread effort directed to this end. It is hopeless to expect wholly to control by the methods of isolation a disease to which there is such universal and high susceptibility—a susceptibility which is shown to be persistent throughout life, unless immunity has been conferred by actual attack.

Measles is a disease of intense infectivity, rapidly diffusible throughout any unprotected community amidst which it appears. Like a fierce combustion it is quickly extinguished by the exhaustion of its consumable material. In the comparatively brief period of its infectiousness, it is akin to smallpox, varicella, and mumps, and in contrast to scarlet fever, diphtheria, and typhoid. These latter diseases are normally of low infectivity, diffusing themselves slowly, in so far as their manner of spread is limited to that of personal or contact infection, even sluggishly, but persistently through prolonged periods. In the gamut of duration of infectiousness they are intermediate in their range between the brief infective periods which characterize measles and small-pox, and the extended intervals during which the infection is active in such diseases as tubercle, leprosy and syphilis. But the comparatively brief period during which measles is actively infectious is compensated by the rapidity of its diffusion in its pre-eruptive and unrecognized stage. One condition, and one condition only, places any permanent barrier to its spread, and that is the protection conferred by immunity. The control of measles, so far as one can judge from a broad survey of the facts, is likely to be successfully effected when a vaccine has been discovered, analogous to the vaccine which where it has been efficiently used has banished small-pox. Until this has been done, it would seem that measles must play its time-honoured rôle and visit in continually recurring epidemics the successive generations of men, who in this natural but sacrificial manner acquire the protective immunity which enables the greater mass of the population to withstand the otherwise ever present presage of a pandemic disease.



Average weekly number of cases of measles in London (continuous line) and Willesden (dotted line), 1908-12.



Average weekly deaths from measles in London (continuous line) and Willesden (dotted line), 1908-12.

A Note on an Epidemic of Measles at Rotumá, 1911.

By B. Glanvill Corney, I.S.O.

It is now just twenty-nine years since I had the honour to lay before the Epidemiological Society a record of the great measles epidemic which took place in the Fiji Islands in 1875.[1] What I am permitted to relate to you now records, I regret to say, a similar calamity which has but recently befallen the interesting native community inhabiting the little island of Rotumá, an outlying dependency of the colony I have just named. In the paper referred to, I mentioned that, as far as I could vouch without my notes before me, measles had not up to that time (1884) extended from Fiji to Rotumá, nor to other adjacent clusters of islands. Since then, Tonga has acquired it from New Zealand; and Fiji experienced a second but milder epidemic of it in 1907 from the same source, when the mortality amounted—using round numbers—to 1,800 out of 30,000 cases in a native population of about 89,000, who had had no contact with measles for thirty-two years. It is a fact, however, that Rotumá continued to escape infection until the early months of 1911, and it is to what has taken place at that island in this latter year that I now invite your attention for a few minutes only, because my statement will necessarily be confined to bare facts and a few figures, for a reason that will appear.

As Rotumá is but little known to the outside world, perhaps I may be excused if I offer a brief description of it and its geographical position. It is situated in latitude 12° 30′ S. and longitude 177° E., some 260 sea miles distant from the nearest part of the Fijian archipelago, from which it bears N.N.W. The most southern atolls of the Ellice Group lie about the same distance off in a north-easterly direction, and the nearest of the Samoan islands is Savaii, 600 miles E. ½ S. from it. It is of volcanic origin, being formed mainly of igneous rock and the products of its gradual weathering and disintegration, but is girt about all around at the sea-level with a fringing reef of coral. Its highest point reaches 840 ft. above the sea, and though no fewer than six ancient crateriform vents are recognizable, none of them have been active within the ken of local tradition or legend. The area of Rotumá is but 14 square miles, its total length is less than 9 miles, and its width varies from a stone's throw to 2 miles and 1,280 yards. In dealing with the land I am employing statute miles.

---

[1] *Trans. Epid. Soc. Lond.*, N.S., 1883-4, iii, pp. 76-95.

Although but a tiny spot upon the face of the waters, Rotumá is one of the most fertile and productive of South Sea islands; while, notwithstanding its remoteness and isolation, and in spite of Home Rule holding sway amongst them, its couple of thousand natives rank with the most prosperous, law-abiding, gentle and loyal subjects of the British Crown, under whose ægis and protection they came in 1880 by virtue of their own independent desire.

It was therefore a most unfortunate circumstance that, on January 29, 1911, a steamer called at the island with a case of measles on board. Whether it was definitely apparent, or as yet only in the incubative or pre-eruptive stage, I am not aware. The Government of the island is administered by a European Resident Commissioner; and the Fijian Ordinance to regulate pratique and quarantine matters is not only in force at Rotumá, but there are special restrictive regulations made under it applicable to communication with this island. It is now some twelve or thirteen years since a recommendation I made that a medical officer should be selected for the position of Resident Commissioner was acted upon. But owing to the debilitating nature of the climate, which is not merely hot, but very humid, it is necessary to allow the Commissioner leave of absence at least once in every two years. This officer had proceeded on leave in the customary way towards the close of 1910; and the exigencies of the service in Fiji at that time made it impracticable to supply a medical deputy to act for him during his absence. So that, briefly stated, the infected steamer arrived at Rotumá at a moment when there was no medical officer on the island; communications took place, and measles became implanted amongst the people. I am in a position to state positively that this disease had never previously visited Rotumá during the lifetime of the generations now living; but the late paramount chief of the island, whose titular designation is Marafu, told Professor Stanley Gardiner[1] in 1897 that "when he was a boy measles ran though the whole island, and, he believed, carried off about one person in every house." Marafu remembered, too, to "have heard of an epidemic which followed the great Malhaha war, and was still more fatal." Whether Marafu really knew what measles, as differentiated from other zymotic diseases, means, is an open question, for it is within my personal knowledge that intelligent Fijians have sometimes used the term *misila* in reference to any widespread epidemic, such as influenza or dengue, since they learnt it in 1875. Marafu was an oldish man in 1897, and is not now living; it is reasonable to suppose that "when he was a boy" might refer to any time between 1830 and 1850. Peter Dillon, who was at Rotumá in 1827, described it as eminently thriving and populous, and mentions that "there were more than a dozen white men, deserters from whale ships, then living there, and all of them married two or three wives, according to the custom of the country, and had large families growing up."[1] Another voyager—Lucett I think—writes of as many as fifty-four white men being there about ten years later.[2] The Malhaha war occurred between 1800 and 1805, as nearly as can be fixed; and it is a significant fact that there is other evidence, both traditional and in print, of a very fatal and widespread epidemic of undetermined identity having prevailed in many of the Pacific island groups in 1802 or 1803 when whaling vessels and sandal-wood traders were beginning to become really numerous in those seas. That such was the case in Hawaii and in Fiji is certain; and there is reason to think that in the latter islands, where it was heralded by a parti-coloured three-tailed comet, and marked by an eclipse, the symptoms quoted in the native saga seem consistent with the idea that it may have been measles followed by ileo-colitis, as has happened since.

---

[1] "The Natives of Rotumá," by J. Stanley Gardiner, B.A. Communicated by Professor Alexander Macalister, M.A., F.R.S., to the Anthropological Institute. Vide *Journal*, February and May, 1898.

More than eighteen months have passed since I received, in private letters, news that my friends in Rotumá were in trouble. Measles had broken out there, during the medical Resident Commissioner's absence on leave, and the deaths due to it and its sequelæ were proving very numerous. A few further remarks of a general nature confirming this appeared in the Fijian newspapers, which may be seen in London at the Royal Colonial Institute. But it was not until December last that the Commissioner's Annual Medical Report for 1911 came to my hands. From it I cull the particulars, which, though dealing generally with vital statistics as an annual report should do, has in it some passages with special reference to measles. I may here explain that during the time I was Chief Medical Officer of Fiji a monthly medical report was rendered me by the Commissioner at Rotumá—a practice which I presume has been continued to my successor; but those reports are not printed, and I have naturally not been in touch with them since my retirement from office, which dates from 1908. The population of Rotumá in my time fluctuated but little, and stood usually at about 2,200; but it is believed with reason that it was quite double that number in the first half of the last century, though I doubt whether it even reached 5,000, as an eminent missionary[1] has suggested.

---

[1] "Narrative . . . of a Voyage in the South Seas . . . . , by the Chevalier Captain P. Dillon: London, 1829.

[2] "Rovings in the Pacific," by a merchant long resident at Tahiti: London, 1851.

I now proceed to quote from the Commissioner's (Dr. Hugh MacDonald's) Report[2]:—

"The estimated population of the island at the mid-year was 1,973 persons; and the actual number ascertained by a census taken on November 27 was 1,983.

"The births numbered 79, and the birth-rate, calculated on the number of people on November 27, only reached 39·8 *per mille*. This is a low rate for this place, where rates of 50, 52, 56 and even 59 *per mille* have been recorded. Of the total number, one was a stillbirth and five premature, and the cause of these was infection with measles on the part of the mothers. . . . The male births were seventeen in excess of the female, and numbered 48, the female only 31.

"The deaths numbered 489, and the death-rate reached the enormous figure of 246·5 *per mille*. The death-rate has always been high here, and in former years the lowest rate I have registered has been 37 *per mille* and the highest 54. A death-rate of 73 *per mille* was recorded in the year 1901, when Dr. Hall visited this place in connexion with an epidemic of choleraic diarrhœa [? ptomaine poisoning], which had prevailed for some time before his arrival. The explanation of the high death-rate this year is, of course, the epidemic of measles which, allowed to run through the people for the first time, during my absence on leave, swept them off literally in hundreds. The female deaths were 65 in excess of the male and numbered 277, as against 212.

"I have shown a return[3] of the age-period at which death occurred, and from it will be noticed that death has been most busy among young children, and adults from 20 to 25 years of age. From 5 to 20 years the incidence has not been so heavy, and over 45 years it has been comparatively slight.

---

[1] The late Mr. James Calvert.

[2] Legislative Council Paper No. 28, Fiji, 1912 (Annual Medical Report, 1911).

[3] Not printed with the original.

"The causes of deaths are shown on another return, and among the chief measles leads the way with its 326 victims. The disease, as I have already reported, was in most cases complicated with ileo-colitis, most likely of bacillary origin; in some with tubercular disease of the lungs; in a few with yaws, pneumonia, pregnancy, childbirth, miscarriage. Phthisis pulmonalis follows next with 26 deaths. Since the measles epidemic its prevalence has been widespread. Always regrettably common here, it has become more so of late. Acute broncho-pneumonia carried off twenty children—in most cases the disease might be put down as an after-result of measles. I have put down twenty-three cases to ileo-colitis—following measles in all cases, but where complete recovery from the latter disease had taken place. . . .

"Measles were introduced on January 29 when I was absent, and on my return on March 26, 700 cases were reported to me as existing. The epidemic continued throughout April and May, and finally died out in June. It caused 50 deaths in March, 198 in April, 74 in May, and 4 in June. It was accompanied with or followed by acute ileo-colitis —a very fatal complication in most cases.[1]

"Influenza appeared about the close of April, and continued its course through May. It was unfortunate that it should have followed as close on the heels of the last-mentioned epidemic, as it must have undoubtedly proved fatal to many measles convalescents.

"Mumps were also prevalent in May, and the swellings in many cases disappeared very slowly; it was not, however, very widespread."

The Report adds that owing to the epidemic of measles the progress of vaccination in the island was much interfered with; and that, with regard to the future health of the people, an increase of tubercular disease, only to be expected, however, since the introduction of measles, should be noted. This, Dr. MacDonald hoped, might perchance only weed out the undesirables and leave those best fitted to survive to propagate the race.

---

[1] Cf. *supra*.

The following table represents the vital statistics of the community for the same year:—

TOTAL POPULATION.*

Estimated at the mid-year	1,973
Actual, by census on November 27	1,983

Births.

Males	48
Females	31
Total	79
Rate *per mille*	39·8
Stillbirth	1
Premature	5
Illegitimate	7
Births of mixed parentage	15

Deaths.

Males	212
Females	277
Total	489
Rate *per mille*	246·5

Marriages.

Total number	31
Rate *per mille*	15·6

* Including about a dozen Europeans.

The marriage-rate also was somewhat higher than has been customary, as a consequence of the measles epidemic: some of the survivors whom it bereaved having lost but little time in contracting new alliances.

DISCUSSION.

The PRESIDENT (Dr. W. H. Hamer) said the interesting papers just read had been written by two experienced epidemiologists. They were all familiar with the work of Dr. Butler, but he might perhaps remind them that Mr. Corney read papers before the Epidemiological Society as long ago as in the Session 1883-84, on "Epidemic Diseases in Fiji": and, again, three or four years later, on "Epidemic Cerebrospinal Fever in Fiji." There were present members eminently capable of discussing the papers, including medical superintendents who had charge of institutions in which measles came under treatment, and also members qualified to discuss measles from the statistical side, such as Sir Shirley Murphy, Dr. C. J. Thomas, and Mr. Major Greenwood. Members had all been reading Mr. Greenwood's extremely interesting paper published in a recent number of the *Lancet*. They all felt chastened, and recognized with a sense of resignation that the conclusions of epidemiology, like the conclusions of every other branch of science, had to come under the review and criticism of the expert statistician. Mr. Greenwood was at the present time the only officially constituted appeal authority in this country, and members of the Section were proud to know that one of their number occupied a position in the modern world which could only be compared with that held by the Chief Priest of the Temple of Delphi in the ancient world of Greece. They all hoped the oracle would speak that night.

Sir SHIRLEY MURPHY said he would like to hear discussed the influence which could be effected upon epidemic measles by any step which might be taken by an education or health authority. He confessed his knowledge of the subject was limited to what he had read; and it had given him a rather hopeless view of the prospects of dealing with a rising epidemic of measles. He was sure Dr. Thomas, who had specially investigated the subject, must have something to tell.

Dr. C. J. THOMAS said he was not at all convinced that the elementary schools played such an evil part in measles as was generally attributed to them. It was difficult to conceive of a community of civilized people in which such schools did not form a part: and it would be an extraordinary thing if the way in which measles spread was not modified in some direction by the fact that children attended school; the majority of the children being in school the spread of measles must take place amongst them while in school. But this did not necessarily mean that the same children would not suffer if schools did not exist. Before dealing with some points arising out of Dr. Butler's paper, he wished first to express his satisfaction at hearing two such papers, one dealing with outbreaks in "the Hub of the Universe," and the other in one of the far outposts of the Empire. Measles being, perhaps, the most important disease we had to deal with, it was most desirable to arrive at a true appreciation as to the way in which the disease spread, and hence, what could be done to mitigate its effects. Measles was modified in big towns by the elementary schools in this way. Each child able to contract measles he would represent by a grain of gunpowder spread on a plane surface. In time these grains of powder would so approximate to each other that a light applied at one edge would ignite the whole train. This is what occurred in a community without schools. In a district in which school attendance was enforced, however, the conditions were different. During waking hours of every day this material was swept into little heaps, leaving spaces between, over which there was some difficulty in passing. Instead of having one sheet of flame of equal intensity, there were a progressive series of definite explosions. Heap after heap exploded, but there was a certain amount of resistance offered in passing from heap to heap, and occasionally a heap missed fire altogether. An advancing wave of measles passed thus from school to school in London. At the present time it took six months for measles to spread two miles in London. He did not think it could be said that the separate explosion method of spread of measles was worse than the other. A point of the utmost importance was that without the elementary schools one would lose the source of knowledge of cases of measles. That brought him to Table VI. Here Dr. Butler modestly said his numbers must be wrong. But how could they be wrong? They were the number notified in elementary schools, and the number of deaths among those notified in this way. Yet Aberdeen gave a mortality of 13·9 per cent. and 10 per cent. at two ages, whereas for the same periods of age Willesden gave 2·8 per cent. and 5 per cent. respectively. Optimist though he was, by race and temperament, he felt a pessimist in reference to ability to stamp out or arrest an epidemic of measles Still, by trying to mitigate the effects of it, and reduce the mortality from it, much could be accomplished. The knowledge with regard to individual cases which the elementary schools furnished would greatly help in bringing that about. Attempts to postpone the age of incidence by rough methods of school closure meant a gross interference with school work, with very small results; at the best one could hope only for postponement for some five months or so. More was to be hoped for by following up notifications from the schools and giving advice to parents and others. A Medical Officer of Health in London sent a letter recently complaining that he had had notifications of cases of measles which were a month old, and he wanted to know if anything could be done to speed up notifications. Investigation showed that those cases arose in children who had been excluded on the appearance of the first case in their class of the disease, and they were notified on the return of the class to school, the earliest day that the attacks could become known. There had been no means of the Medical Officer getting knowledge of those cases, and so bring to bear his resources upon them. The success of the School Medical Officer meant the failure of the Medical Officer of Health. Raising the age of school life had often been put forward as a means of postponing measles. If part of these islands could be taken as an experimental area, and children were not allowed to start school until 6 years of age, and in another part children were allowed at 3, probably some difference in incidence and mortality would be found if schools had really the effect sometimes ascribed to them. That experiment had, however, actually been carried out; for in Scotland the age of commencing school was higher than in England; in Aberdeen there was no modification of the severity of measles; children got measles at younger ages, and the mortality was as great at the younger ages as in the large towns of England. In the case of the diagrams with the peaks, he could not say Dr. Butler showed the cloven foot, but he certainly dropped a few feathers from his wings when he said he wished the lowering of the peak came after the holidays, instead of before. That table became clear as soon as one looked upon the schools as a steadying factor in measles, and the holidays as a disturbing factor. During school time, one had all, except 2 or 3 per cent. of children who could run about to any degree, under observation, and the striking area became notably limited, whereas during holidays they were scattered far and wide, and the same conditions obtained as if there were no schools. Moreover, at that time there was much visiting, and possible sources of infection were distributed to wider areas. Holidays extended the striking range, hence measles took a number of new holds on communities during the holidays. Then followed the steadying effect of schools limiting the range of infection, and before the end of the school term one began to see a sinking of the measles figures. Again it was interrupted by holidays, and up went the figures during the earlier part of the succeeding term.

Dr. SHRUBSALL asked whether Dr. Butler considered what was the importance from the standpoint of the individual child of the different mortality at different age-periods in school life? If one postponed the age at which measles came on, was one thereby materially increasing the chance of younger members of the family suffering from the disease, since with the lapse of time more children might have been born?

Mr. MAJOR GREENWOOD desired to raise one or two questions which he regarded as of considerable historical interest. The first concerned the history of measles in this country. The difficulty seemed to be that, although the description quoted by Dr. Butler from Rhazes showed clearly that the clinical features of measles might have been very similar in mediaeval times to now, yet he thought that morbilli certainly comprised other diseases than measles. This was seen if one attempted to trace the history of scarlet fever. It was known that one of the earliest recognizable descriptions of scarlet fever was due to Ingrassia, of Palermo, in the sixteenth century; but, if one looked at the large number of quotations from the Arabian school, given in Haeser's classical work, it was clear that a good many of the descriptions of morbilli given by that school were, in all probability, anginal scarlet fever; and it was usual in the passages quoted to regard morbilli as a more serious disease than variola. The most interesting point was whether such fraction of morbilli as corresponded to true measles consisted of a disease virulent to a degree comparable with experience of it when it attacked virgin soil now. The second point which he regarded as of historical interest was as to the passage which Dr. Butler quoted from Dr. Robert Watt. He (the speaker) thought the President's iconoclasm was tending to affect him, so that he was beginning to doubt whether Dr. Robert Watt's work was so extremely important a contribution to epidemiology as Dr. Creighton had said; for Dr. Creighton described it as "one of the earliest and most memorable inquiries in vital statistics in this country." Of course, Dr. Creighton's reason attached great importance to Watt's view, since he (Dr. Creighton) regarded the decline of small-pox as an example of one disease being substituted for another. He (Mr. Greenwood) would be interested if other members of the Section had turned up Watt's paper. What Watt gave was the total number of burials classified by disease, and what he showed was, that the proportion of deaths from measles to the deaths from all causes had increased. So far as he had read Watt, he was not clear that he was talking about *fatality*, or that the fatality of measles was 10 per cent. and 1 per cent. in the different periods. He believed in the table it was that the ratio of deaths from measles to deaths from all causes was 10 per cent. in the last period and 1 per cent. in the first period. He did not see how Watt could get at the fatality, because he did not believe Watt knew the number of cases of measles. Dr. Creighton mentioned that Watt did not give the constitution of the population, and although it was probable that the absolute population was available, still it was certain that he had not got the population at different ages. As that was a period in which the effects of the industrial revolution were being felt, it could not be denied that the public health of Glasgow might, for all Dr. Watt said to the contrary, have been better at the end of that period than at the beginning: it was a question of a disease being relatively more important, not necessarily absolutely more important. If one could show that the death-rate of one disease diminished faster than the general death-rate, it was obvious some other diseases must have increased relatively in importance. That did not seem to him to be a very epoch-making discovery. Watt's paper was referred to by Farr many years ago.[1] It was remarked that the rate of child mortality in Glasgow was extremely bad, even as late as the forties; and Farr considered that the defects just mentioned did not invalidate Watt's induction that measles was substituting itself for small-pox, and offered an explanation, in which he admitted the principle of natural selection among organisms of disease. The interesting point was, how far this principle of substitution, which Dr. Creighton had made much of, was an important principle in epidemiology as it was known

[1] "Vital Statistics," 1885, p. 321.

now. His last point was theoretical, and he merely wished to ask a question with regard to the diminished fatality of measles at the later ages. He believed it was Dr. Whitelegge who, in a paper on scarlet fever, some years ago, pointed out the diminished fatality of that disease at the later ages, and suggested that isolation and measures to prevent spread led to a saving of life, because they warded off the disease until later years of life, when the fatality was less. Surely it was very important to decide between the alternatives indicated by Dr. Butler. Was it that the people who got measles later in life showed a lower case mortality because they had already survived small doses of the disease, natural vaccination, as it were, from the disease? If so, supposing by some method, which was conceivable but not practicable, one could take a section of the child population, and absolutely shelter each child in that section from measles, when they got measles by exposure later in life, might the fatality not be as high as in the case of children at earlier ages who got it in the ordinary course? In other words, was the lower fatality at later ages due simply to a weeding out, as it were, of susceptibles plus inoculation or vaccination of normals, or was it due simply to the increased physiological resistance which came with years? He took it that an approximate solution of that problem was very important in determining whether delaying, if it was artificially done, was likely to produce the same effect as a delay which naturally occurred.

Dr. MILNE said he would like to give a short résumé of his personal experience with regard to measles, especially after the pessimistic views given on the subject of the control of measles. For over thirty years he had been deeply interested in the subject, and two years ago he read a paper before the same Section. The experience of the past two years most fully confirmed his position—that measles could be controlled and prevented. From many instances he gave the following: Two years ago, owing to neglect of precautions he insisted on, the cases of measles, in all, ran up to eighty in a community of 1,400 children. One of our best-known physicians, as well as a celebrated surgeon, together, visited the home where the outbreak was at its worst. The physician said that there ought to be an isolation hospital among so many children. He (Dr. Milne) pointed out to him that it was by far the worst outbreak that had occurred for twenty-seven years, when there were 144 cases among less than 500 children. When the disease increased so rapidly, two years ago, he kept 200 children from school; he specially visited all the cottages in which measles cases had occurred, twenty-three in number, to ascertain if the plan of treatment had been carried out. It had not. Printed directions were sent for every cottage mother, and a nurse set apart to have it carried out. The children returned on the same day to school. He assured the physician and surgeon that all would be over in less than three weeks after the treatment was fully carried out. This was actually so, except for two cases the following month. From what Dr. Bezly Thorne said at the debate on his paper two years ago, a most interesting test has been carried out. From two to four drops of the best eucalyptus oil was given on sugar, according to age, to every boy in a home of 400 boys, of from 4 to 12 years of age. These boys attended four different public schools. In the vicinity measles had been very prevalent, and some of the schools closed on that account. The eucalyptus oil was thus given to prevent infection. It failed. A fresh arrival developed measles fourteen days after his admission to the home. Other cases, by the dates, were infected from the schools where many cases had occurred. Sixteen days ago he commenced giving the eucalyptus oil, as he formerly described, by inhalation, and which he had never found fail. To-day, when he visited the home, the Governor said "they were out of the wood." The only cause for anxiety was that pens and pencils were indiscriminately distributed, twice daily, in the schools these boys attended, and he wondered whether the eucalyptus oil would be sufficiently powerful to prevent infection from mouth to mouth. If not, then next week he would keep all the children from school, unless supplied with individual pen and pencil, carefully marked, and kept for the individual; then the full benefit would be realized. About three weeks ago he had a telephone message from the Governor of The Girls' Village Home stating that a service girl had been returned from Highgate in a motor ambulance suffering from measles, and asking what could be done with her? His reply was to ask the matron of the hospital to take her into an empty ward, and thoroughly rub her with eucalyptus oil, and treat her throat with 10 per cent. carbolic oil, then put her in the large ward where nineteen children were, and carry out the usual treatment. She was there all the time. There was neither infection nor complication. During the past two years at their seaside home at Felixstowe, where they had a most experienced matron, measles had appeared on three different occasions, amongst three different lots of children, and months apart. The different parties numbered from thirty to fifty. They were treated at once. There was neither spread nor complication. The medical attendant said, "It was most wonderful." Combined with the evidence given in the paper referred to, this proved that measles was as much under our control as scarlet fever.

Dr. E. W. GOODALL said he had listened to both the admirable papers with great interest. Measles appeared to be one of the diseases known to the ancients; but he was of opinion that some of the cases described by Rhazes as having been measles, which turned to small-pox, were really cases of small-pox with an initial morbilliform rash. Some years ago he had been desirous of ascertaining the number of cases of measles occurring in London, a point on which Dr. Butler had touched in speaking of the Willesden figures. Dr. Butler had the cases in schools notified to him, but he (Dr. Goodall) did not know to what extent this was done in London generally. It was of some importance for the body of which he was an officer—the Metropolitan Asylums Board—to have an idea as to the number of cases which were likely to occur in any given time and in any given locality. It was, however, very difficult to ascertain the number. The only long series of notifications he had been able to find in the limited time he had to conduct a search into the question was the Aberdeen series for twenty years. In London, figures had been available only since school investigations had been carried on: otherwise there were only the deaths to go by. Was one justified in assuming that the fatality, as shown by the Aberdeen figures for twenty years, could be applied to London? He calculated that, if one took as a basis for the morbidity the average case-mortality which was exhibited in Aberdeen for those twenty years, then there must have been 100,000 cases of measles in London in the year 1906. In 1896 there were upwards of 3,600 fatal cases, and the total number of cases must have been very large indeed. The number of beds which would have to be provided for the isolation of the bulk of measles cases in London during an epidemic would be appalling. Dr. Butler had shown how curiously epidemics varied from time to time. He was surprised no reference had been made to the epidemic which swept over London two years ago. It began in July, 1910, and culminated in the following March. He believed the number of deaths in one week in March, 1911, was 197, or about 130 above the corrected average. One would have gathered from the large number of deaths in the first quarter of 1911 that London was in for a record year of measles deaths in London. But the deaths fell short of those for 1896 by considerably over 1,000. Though there were 1,428 deaths in the first quarter of 1911 there were only 140 in the last. Recently another epidemic seemed to have commenced, judging by the number of cases now being admitted to hospital. He would like to hear whether there was any special reason why these epidemics should occur about every two and a half years. Did it not seem as if they were not much influenced by school attendance? With regard to the case-mortality, only the worst cases were being sent to hospital. At present they were admitting only the Poor Law cases and the poorest of the class just above the Poor Law class; hence the case-mortality was extremely high. For the year 1911 the case-mortality at the Eastern Hospital was 20 per cent., which was very high indeed for such a disease as measles. But for the year 1912, though the cases were drawn from the same classes as before, and though there were about the same number of cases (700), yet the case-mortality was 13 per cent. Whether an epidemic was particularly fatal at the same time that it was particularly infectious, he did not think had been worked out in regard to measles. He did not believe that those two factors necessarily went together, nor that one could assume the number of cases from the number of deaths. The statistics of the cases treated in the Asylums Board Hospitals bore out the statement that the younger the patient the more fatal was the disease. It was especially fatal in very young children. The principal cause of death in measles in London was broncho-pneumonia; and, if the cases could be placed under treatment earlier, so as to ward off that complication, something definite would be done to decrease the mortality. He agreed that in a prophylactic vaccine would probably be found the most efficacious means of dealing with measles.

Sir SHIRLEY MURPHY asked if Dr. Butler could give information concerning the age-distribution of the first attacks in houses during the holiday period, and in the rest of the year, separately. If schools were productive of measles in any large degree, one would expect to find the age-period distribution of the first cases in houses during the holiday season quite different from that at other periods.

Dr. SANDILANDS said there was one question which seemed to him to be of importance—namely, the question as to the cause of death in measles. It had been said to be essentially broncho-pneumonia: and he wanted to know what was the cause of the broncho-pneumonia which led to death. It was important to decide whether it was due to exposure to cold and draught through failure to keep the child in bed. Or was it due, on the other hand, to overcrowding and to closeness of the atmosphere in a stuffy, ill-ventilated tenement? Until the matter was clear, it was difficult to know on what definitely to advise the mother, when one visited the home to point out the best course to pursue in the event of younger children being attacked. That led to the question whether one could really be satisfied that a single visit would produce, in an unsatisfactory home, conditions which would materially influence the chance of a child either surviving or dying. If there was no particular condition on which one could lay one's finger, if it merely came to the question of nursing, which could only be obtained in hospital, it seemed that, short of hospital treatment, a visit to the home was not likely to have any material influence. He would like to hear what Dr. Butler had to say on the essential causes of the mortality being higher among cases nursed at home than in those tended at hospitals. In many cases, the value of the advice to parents about calling in a doctor was discounted by the fact that medical men could be found who would prescribe for a child without seeing it, having accepted the mother's diagnosis. He was not satisfied that the commonly accepted theory which attributed the broncho-pneumonia of measles to "cold" was based on the results of scientific observations. The polluted air of an over-heated and over-crowded tenement might well be a more important cause of the same fatal complication. Or, again, the pneumonia might be due to an inevitable microbic invasion in debilitated subjects. In order to give effective advice, more precise knowledge was required as to the relative importance of these three possible factors in the production of death from measles.

Mr. CORNEY, in reply, said the paper he read was almost entirely historical rather than debateable, because the Medical Officer not being in the island when the outbreak occurred, the details were very scanty. The paper stated that death had occurred most frequently among young children, and among adults of 20 to 25 years. He had no figures dealing with the general incidence of the disease. In the Fiji epidemic of 1875 the incidence was practically universal; almost every native in a population of 150,000 took the disease; and the deaths were nearly 40,000 in four months. In the Fiji outbreak in 1904 there were

30,000 cases, limited largely to persons under 25 years of age, doubtless because the older inhabitants had been immunized by the previous visitation. There had been no case from 1884 to 1904. In Fiji the chief advice to natives was as to what not to do: copies were sent to all the headmen, who had the instructions read out to assemblies of the natives; they were also printed in a native magazine and almanack. Many of the deaths were precipitated by the practice of sitting in the streams and pools, to get cool when they felt the fever on them, from which broncho-pneumonia resulted. But in the Rotumá outbreak most of the cases seemed to get ileo-colitis or dysentery, there being no streams or pools in that island. Naturally the discussion had been mostly concerned with the behaviour of measles in this country, but he was appreciative of the attention which had been accorded to his contribution.

Dr. BUTLER, in reply, desired first to thank Mr. Corney for his paper, and to express the hope that when the more detailed figures from the annual report came into Mr. Corney's possession, he would add them to his paper, so that they might be included in the *Proceedings* of the Society. He thought it very important that an outbreak of that kind should be placed on record as fully as possible, as such instances afforded valuable information of the manner in which measles acted upon a totally unprotected population. Another point of interest in Mr. Corney's paper was the extraordinary high mortality in that year from phthisis pulmonalis—namely, twenty-six deaths in a population of under 2,000, which was ten times the rate in London, and occurring, moreover, in a population living not under urban conditions and in a climate which was supposed to be favourable to protection from tubercle.

He thanked members of the Section for the manner in which they had received his own paper. He could not complain of undue criticism. Even Dr. Thomas found it necessary to play the part of *advocatus diaboli*, and had felt impelled to overstate his case. Dr. Thomas was much more sanguine about the means at the disposal ot the profession for controlling measles than he himself was. While he (the speaker) had had to modify his attitude as to the part played by schools in diffusing the disease, Dr. Thomas concluded that the schools were positively a means of throttling the disease. He did not think the depression in the curve shown in the diagram which occurred during the holiday period had anything to do with the fact that it had been throttled during the time of school attendance, and the curves did not bear that suggestion. It was very difficult to conceive how any means at present available could have that effect. The seasonal curve of measles did not apparently bear any relationship to attendance at school. It might be that it would be longer drawn out, that it would be a flash along a straight line rather than a hump if the children were not aggregated to the extent now obtaining. But one always got, during the middle part of the year, the lowest incidence from this disease, an incidence which he could not believe would be modified even if one did away with school attendance altogether. But there was no doubt that measles was spread in schools. Experimentally that could be demonstrated, for by closing the schools the cases fell during the period of non-attendance, and one could re-open after such a period and the schools remained free. If the children attending those schools were unprotected by previous attacks of measles, one would otherwise have had the whole of the school children attacked. It was possible, by preventing contact, to protect children from the incidence of measles at the earlier ages, as shown by the experience of the public schools. The outbreak at Osborne could not be paralleled in any public elementary school in London. One could not get among boys of 13 years of age and over, an outbreak of measles such as frequently occurred in public schools. One could have measles introduced into the senior departments of public elementary schools without disturbing them much, because the children were already protected. But at Marlborough, and other public schools, when a disease broke out, down the boys went. They were a class in the community which had been protected by not being brought into contact with the disease. And that brought him to Mr. Major Greenwood's point as to the diminished fatality at later ages being possibly due to acquired resistance owing to a species of natural vaccination by small or attenuated doses of the virus. Against such explanation was the fact that one found that the fatality rate was uniformly low in all the experiments at the higher ages. The elder children in a family who took measles in the public elementary schools at 5 years of age had a low fatality-rate, although their younger brothers and sisters at home died at a higher rate. It was not that they had been protected by attenuated doses, because they went to school for the first time at 5 years of age, and 80 per cent. took the disease at this period of maximum susceptibility, though only a small proportion died. One did not find a high fatality-rate among public-school boys who presumably had not been protected by the attenuated dose. The natural vaccination against measles, if it operated at all, operated in protecting against attack rather than fatality, and accounted for the diminishing number of persons who with advancing years showed a susceptibility to measles. The cause of the measles fatality was the pulmonary complication, and that was the answer to Dr. Sandilands's question as to what advice should be given to the mother. It was a question of hygiene. Where one could anticipate an outbreak of measles in a household, it was possible to maintain a low fatality, even among the younger children, by insisting on the observance of the elementary rules of hygiene. Above all, the children must be kept warm; exposure to cold precipitated pulmonary complications; the rooms should be well ventilated, and the children warmly clad. In reply to Sir Shirley Murphy, he regretted he had not got a table showing the age-distribution of first attacks during holidays in houses, and he feared his data would not enable him to construct such a table. What struck him about his figures was that, assuming the fatality-rate was the same among the cases which did not come to knowledge as among those which did, there must have been during several years over 3,000 cases a year in Willesden.

where the births numbered 4,000 per annum—i.e., a number equal to three-fourths of the births. He did not think there were as many as that number. He thought the case-fatality was greater among those who did not come to knowledge. He agreed with Dr. Thomas as to the importance of the schools in enabling one to know what houses were attacked by the disease, so that due measures could be taken. It had been interesting to him to hear the discussion on a disease with which most households made acquaintance, by reason of its wide prevalence, and which appeared to remain unmodified by all the measures which had been taken. For that reason it had a pre-eminent claim on the attention of epidemiologists.

Section of Epidemiology and State Medicine.

April 4, 1913.

Dr. W. H. Hamer, President of the Section, in the Chair.

The House as a Contributory Factor in the Death-rate.

By A. K. Chalmers, M.D.

The influence of the house on the health of its inmates is no new theme. It has frequently been discussed in relation to surface density, (the number of houses or persons on a limited area), and in relation to the cubic space within the dwelling. I propose to-night to ask your attention to it from the point of view of the age of its inhabitants.

At the 1901 census I had an opportunity of comparing the death-rates obtaining in our Glasgow population among the inmates of houses of several sizes—i.e., according to whether they occupied one, two, three, or four and more rooms, and what seemed to demand an explanation was the very considerable interval which separated the rate obtaining among the occupants of the one-roomed house from those occupying two apartments, but more especially from those occupying three apartments and upwards. For example, among the one-apartment population, which numbered over 100,000 persons, the death-rate approached 33 per 1,000; the two-apartment population approached 350,000 and had a death-rate of 21 per 1,000; in nearly 152,000 persons occupying three-apartment houses the death-rate was under 14 per 1,000; while in over 136,000 persons occupying houses of four apartments and upwards it was only 11 per 1,000.

The difference between the extremes was so great as to suggest a discrepancy in the units compared, but lack of information regarding the age-distribution of the several populations made it impossible to carry the comparison beyond a simple statement of the relative prevalence of certain groups of disease among them. It was thus possible to show for the zymotic group (as then understood), for phthisis, and for the other diseases of respiration separately, that the rate followed the direction of the general death-rate—in other words, that the death-rate increased as the size of house diminished.

The element which was lacking in the 1901 inquiry I have now been able to obtain from the 1911 census, and the first scrutiny of the age-distribution suggested that a very considerable portion of the differences in the death-rate could be ascribed to the larger proportion of children in the smaller houses. It showed, for example, that while 11 per cent. of the total population consisted of children under 5 years, in the one-apartment population they formed almost 19 per cent., and in the two-apartment almost 14 per cent.; while in houses of three and four apartments and upwards the proportions were 7 and 4 per cent. respectively. A further point of importance emerged when the deaths were cast for these several groups of the population in the disclosure that even when corrected for age-distribution the death-rate of the population occupying four apartments and upwards was slightly under 12 per 1,000 (in a population of over 160,000), a quite unlikely, if not indeed a wholly impossible, rate in any mixed population living under existing conditions. Both together inevitably raised the question whether it was possible to get any nearer the true significance of the relationship between house-room and death-rate, and I propose submitting for your consideration some features of the analysis which was undertaken in the endeavour to throw light on this question.

Few words are necessary to indicate the volume of the material employed. The census population (784,496) was taken as the central population of a period of three years, and the deaths were those occurring throughout a period of eighteen months on each side of the census date. The total deaths exceeded 39,000, and the aggregate population during the period exceeded 2,350,000. The age- and sex-distribution of the population occupying houses of the several sizes I have mentioned had been extracted for local purposes,[1] the ages being in twelve age-groups and the occupants of all houses of four apartments and upwards being taken together. The deaths were now similarly distributed, save in the first instance, those occurring in institutions and having no home address to which they could be allocated. To this I shall return.

Having reached this point, we were in a position to ask whether a comparison with the corresponding rates for 1901 afforded any information regarding the distribution of the reduction of the general death-rate which had characterized the period generally. In 1901 the death-rate for the city as a whole and for all ages and both sexes was 20·6 per 1,000; in 1911 it was 16·6, a reduction of over 19 per cent. Could it be demonstrated that this reduction had been shared in equal degrees by all sections of the population? Subject to explanation afterwards I introduce the following table:—

---

[1] Census Report, 1911. Glasgow and its Municipal Wards. By the Medical Officer of Health.

REDUCTION IN DEATH-RATE DURING THE DECADE ACCORDING TO SIZE OF HOUSE.

Death-rate from all causes in houses of several sizes.

	Census population		Deaths		Death-rate		
	1901	1911	1901	1909-12*	1901	1909-12	Per cent. decrease
1 apartment	104,128	104,641	3,405	8,161	32·7	25·9	20·8
2 apartments... ...	348,731	367,341	7,418	18,287	21·3	16·5	22·5
3 apartments... ...	151,754	160,083	2,081	5,515	13·7	11·5	16·0
4 apartments and upwards	136,511	127,549	1,533	4,119	11·2	10·8	3·6
Institutions and harbour	20,588	24,882	1,072	2,942	52·3	39·3	24·9
Not traced	—	—	207	—	—	—	—
City	761,712	784,496	15,716	39,024	20·6	16·6	19·4

* Fourth quarter, 1909; first three quarters, 1912.

What significance are we to attach to this reduction in the general death-rate by almost one-fifth in ten years? Before considering this, certain changes in the age-distribution of the population are to be noted. Between 1901 and 1911 the population of Glasgow increased by barely 9,000,[1] but the increases were confined to age-periods over 35 years, save at ages 10 to 15 in males and 5 to 15 in females. In both the increase was purely nominal (0·1 and 0·69 per cent.), while of greater importance is the reduction at ages under 5, which in number amounted to 4,752, and represented a reduction of 5 per cent. on the 1901 population at these ages. In relation, however, to the total population this reduction was only about ⅔ per cent., and as during the last twenty-five years the death-rate of children under 5 has fallen from 86[2] to

---

[1] Within the area as at 1911.

[2] A new Life Table for Glasgow, based on the mortality of the ten years, 1881-90, by A. K. Chalmers, M.D., D.P.H.

60 per 1,000 for boys and from 76 to 49 for girls, there is ground for regarding the decline in the death-rate of the last decennium as resulting to a considerable extent from a reduction in the rate among the inhabitants of the smaller-sized houses. This view is, I think, supported by the even greater decline in the death-rate of the institutional group, for, as we shall see, there are certain anomalies in the rates for the higher ages in small houses which arise, I think, from a drift of the sick and infirm among their population in the direction of institutions in later life.

In his address as President of the Preventive Medicine Section of the York Congress of the Royal Sanitary Institute, Sir Shirley Murphy approached this question of the incidence of the decline in the death-rate on the basis of the proportion of children of school age attending elementary schools, and regarded the evidence as suggesting not only that the decline in the death-rate in the total population might in part be related to improved environment, but that it was progressing more rapidly among the lower social grades. The preceding table shows a reduction which amounts to over 22 per cent. in our two-apartment houses, but falls to less than four in houses of four apartments and upwards. Our birth-rate fell by fully 12 per cent. during the decade, but the difference in the proportion of children under 5 in the two periods was less than 1 per cent., and difference in age-distribution alone will not account for the decrease.

AGE- AND SEX-DISTRIBUTION.

Meanwhile, in order to disintegrate the effect of age and sex, I insert the death-rates for males and females arranged in age-periods and grouped according to the size of house occupied.

Here the sexes, taken separately, maintain the features of their combined death-rate in relation to the size of house. Females at all ages have a rate of 25 per 1,000 in one-apartment houses; 16 in two-apartment houses; 11 in three-apartment houses; 9 in houses of four apartments and upwards; and 45 in institutions. For males the corresponding rates are 27, 17, 12, 13, and 37.

At each age-period also, as a rule, the death-rate is lower as the house increases in size, the main differences being at the later ages when, as I have suggested, the drift to institutions has become established. The exceptions otherwise have usually an obvious explanation. For example, the rate for males at ages 35 to 45 in four-apartment

1909-1912.—DEATH-RATE FROM ALL CAUSES AT SEVERAL AGE-PERIODS IN HOUSES OF SEVERAL SIZES.

Males, per 1,000 living.

Size of house in rooms	AGES												All ages
	—1	—5	—10	—15	—20	—25	—35	—45	—55	—65	—75	+ 75	
1 apartment	210·25	40·56	6·97	4·54	4·82	5·24	5·11	12·55	29·18	41·17	85·11	105·90	27·26
2 apartments	163·88	30·20	5·56	3·16	3·94	5·40	5·42	9·01	19·30	39·69	76·12	158·07	17·07
3 apartments	128·25	17·94	3·49	2·18	3·14	3·81	4·90	7·61	14·63	29·49	64·15	146·07	11·96
4 apartments and upwards	102·57	10·27	3·47	1·80	2·71	2·97	3·92	8·50	14·49	27·79	67·47	157·12	12·89
All houses	169·29	29·67	5·20	2·90	3·56	4·44	5·03	9·12	18·16	34·06	71·90	147·36	16·71
Institutions and shipping...	374·07	51·95	13·13	5·74	6·40	7·67	13·10	21·50	32·97	67·25	119·87	234·45	36·71
City	171·29	30·01	5·32	2·94	3·62	4·59	5·44	9·94	19·34	37·21	77·54	157·07	17·61
Females, per 1,000 living.													
1 apartment	163·64	37·47	6·92	4·46	5·61	5·89	7·37	14·86	26·84	37·28	61·09	83·85	24·90
2 apartments	123·31	26·75	5·18	3·11	3·95	5·57	6·50	9·75	18·39	35·36	67·48	125·03	16·12
3 apartments	101·07	14·80	4·04	2·33	2·87	3·40	4·32	6·93	10·17	24·99	54·46	147·43	11·02
4 apartments and upwards	72·95	9·87	3·10	1·45	1·64	1·86	2·58	4·90	8·03	17·89	40·01	145·26	9·19
All houses	129·14	26·48	5·04	2·86	3·29	4·15	5·47	8·86	14·75	28·43	56·46	127·06	15·03
Institutions and shipping	365·45	51·65	9·55	8·37	12·43	7·72	10·05	32·33	48·51	82·61	159·73	213·98	45·47
City	131·26	26·77	5·10	2·95	3·44	4·25	5·57	9·20	15·31	29·77	60·68	133·51	15·61

houses exceeds that of three apartments, but digestive diseases are more prevalent, and phthisis reaches its maximum incidence in them. Phthisis also explains the higher rate in two-apartment males at ages 20 to 25.

Male v. Female Rate.—At the several age-periods also the male rate usually exceeds the female, the exceptions, however, being of some importance. In one-apartment houses the female rate exceeds the male at ages 15 to 45, and in two-apartment houses at ages 20 to 45. Puerperal fever and septic diseases prevail among females at these ages, while phthisis contributes partly to the excess at ages 25 to 45. In three-apartment houses the excess is confined to ages 5 to 15, when the female phthisis-rate exceeds that of males. Generally, therefore, the analysis, I think, warrants the suggestion that the variations in the death-rate at all ages associated with houses differing in size are not to be explained by simple differences in age and sex constitution.

THE DEATH-RATE AS TESTED BY A STANDARD POPULATION.

But in order to get rid of the discrepancies arising from differences in age-distribution and to get all four groups of population on a fairly comparable basis, I have adopted the test of a standard population with the age and sex distribution of the whole city, and applied to the several age-groups constituting it the death-rate ascertained to exist at corresponding ages in the various sized houses. Calculated in this way, the differences become more intelligible. In 100,000 persons with the age and sex distribution of the whole population, the following differences emerge in association with the varying size of house.

CALCULATED DEATHS OCCURRING AMONG 48,605 MALES IN ONE, TWO, THREE AND FOUR APARTMENTS AND UPWARDS, AND IN INSTITUTIONS AND SHIPPING.

Ages	Size of house in rooms				Institutions and shipping
	1	2	3	4 and upwards	
— 1	247	193	151	121	440
— 5	180	134	80	46	231
— 10	36	29	18	18	68
— 15	22	15	11	9	28
— 20	23	18	15	13	30
— 25	24	24	17	13	34
— 35	43	45	41	33	109
— 45	83	60	50	56	142
— 55	134	89	67	67	151
— 65	86	109	81	76	185
— 75	106	95	80	81	150
75 +	29	43	39	42	63
Total	1,013	854	650	578	1,631

CALCULATED NUMBER OF DEATHS OCCURRING AMONG 51,395 FEMALES IN ONE, TWO, THREE AND FOUR APARTMENTS AND UPWARDS.

Ages	Size of house in rooms				Institutions and shipping
	1	2	3	4 and upwards	
— 1	192	145	119	86	429
— 5	166	119	66	44	229
— 10	36	27	21	16	50
— 15	22	15	11	7	41
— 20	28	19	14	8	61
— 25	30	28	17	9	39
— 35	37	33	22	13	90
— 45	99	65	46	33	215
— 55	130	89	49	39	235
— 65	111	106	75	53	247
— 75	105	116	94	69	276
75+	45	67	79	77	114
Total	1,001	829	613	454	2,026

We can now place the several groups on an approximately uniform basis with the following results :—

CALCULATED DEATHS.

Population	One apartment	Two apartments	Three apartments	Four apartments and upwards	Institutions and shipping	All ages
Males— 48,605	1,013	854	650	578	1,631	—
Females—51,395	1,001	829	613	454	2,026	—
Calculated death-rate per 1,000	20·14	16·83	12·63	10·32	36·57	—
Observed death-rate						
Males	27·3	17·0	11·9	12·9	36·7	17·6
Females	24·9	16·1	11·0	9·2	45·5	15·6
Both sexes	25·9	16·5	11·5	10·8	39·3	16·6

It will be observed that the rates for the two, three, and four-apartment houses are little altered in the above arrangement. The one apartment rate, however, is reduced by 22 per cent., and the rate for institutions by nearly 8 per cent. Even so, however, a population of 100,000 with the age and sex distribution here assumed would, with the rates obtaining in one-apartment houses, yield 2,014 deaths annually; in two-apartment houses, 1,683 deaths; in three-apartment houses, 1,263 deaths; and in houses of four apartments and upwards, only 1,032; while in institutions they would number 3,657. These are substantial differences, and indicate very fairly, I think, the varying degrees of resistance to fatal disease presented by the several groups of populations we are considering. In this relative sense I believe them to be strictly comparable; but at the same time none of them are, I believe, to be regarded as absolute rates, if for no other reason than that in a stationary population, even the one-apartment rate would imply an expectation of life at birth of 49 years, or nearly five years more than the corresponding expectation for males in England and Wales, and only something less than four years below the expectation in the selected healthy districts according to the last English Life Table (1891-1900). I am disposed, however, to think that the one-apartment death-rate is understated, for you will observe that contrary to the almost uniform decrease in the number of deaths at each age as we go from one to four apartments, the *male* deaths in two-apartment houses at the ages 25-35 and 35-65, and the female deaths at ages 65-75, exceed in number these in one-apartment houses; while at ages 75+ in both sexes the one-apartment population has fewer deaths than any of the larger-sized houses. And the institutional rate, composed as it is very largely of deaths in Poor Law hospitals, suggests a population recruited largely from sick and infirm people.

In any case, the question has been answered in an analysis of the admissions to the institutions of the Parish of Glasgow during eight weeks of the present winter, kindly supplied me by Mr. Motion, Clerk to the Parish Council. During this period the admissions numbered 2,393, of whom 743 had houses of their own, 364 were from one-apartment, and 346 from two-apartment houses, while the two-apartment population is more than three times greater than the one-apartment.

Can these differences be explained?

Writing some years ago one would have been disposed to leave the inquiry at this point, and to have suggested that if the contrast did not completely establish the case against the smaller-sized house an appeal to the diminishing cubic space per inmate, as the number of rooms decreased, would supply what was wanting in the argument. All this is in a sense true, but the test of the uniform population has shown that the interval which separates the three from the four-apartment death-rate (18 per cent.) is relatively greater than the difference between the rates for the one and two-apartment population (17 per cent.), if we are to accept 20 per 1,000 as the true death-rate of the smallest size of house. It is to be remembered further, that in the population we are dealing with 66 per cent. of the houses are of not more than two rooms, and that 62 per cent. of the population inhabit them—that in six only of our City Divisions (or Wards) is the proportion of one-apartments below 10 per cent.; that in nine wards they form from 10 to 20 per cent., and in six wards vary from 20 to 30 per cent. of the total houses, while in five wards the proportion is above 30 per cent. The smaller-sized houses are, therefore, distributed throughout the City in varying proportions, and their room density reaches a high average.

It is an old observation in Glasgow that the number of occupants per room increases as the number of rooms decrease, and during the period we are considering the average number of inmates in *one*-apartment houses was 3·2, varying, however, from 1·8 to 3·5 in the different wards; in *two*-apartment houses the occupants average 2·4 per room; in *three*-apartment houses 1·7, and in houses of *four* apartments 1·3.

I now propose to ask to what extent the influence of these varying conditions may be traced in the causes of death among the several age-groups, according to the size of house which they occupy.

THE CAUSES OF DEATH AT AGES UNDER 5.

I select the causes of death at these ages for further inquiry because of the importance attaching to them as indices of insanitary conditions. The following general statement shows the rate per 1,000 from all causes at these ages:—

	UNDER 1		1—5		Death-rate under 1 = 100 Death-rate 1—5
	Death-rate	Comparative number	Death-rate	Comparative number	
1 apartment	210·25	100	40·56	100	= 19
2 apartments	163·8	78	30·20	74	18
3 apartments	128·5	61	17·94	44	14
4 apartments and upwards ...	102·57	49	10·29	25	10
Institutions and shipping ...	374 07	—	51·95	—	—

The contrast in the rates at each age-period associated with the house groups here shown is sufficiently striking, but what seems to me of almost equal significance is the rapid improvement in the rate at ages 1-5 in three- and four-apartment houses. Under 1 year the four-apartment rate is still equal to one-half the rate for one-apartments, but during the next four years of life the resistance of the child in three- and four-apartment houses to fatal disease increases so rapidly, or the risks of contracting infectious disease are so diminished, that the death-rate among children in three-apartment houses is less than one-half, and in four-apartment houses only one-fourth that of one-apartment children.

If we attach a numerical value of 100 to the infant death-rate in each size of house, the one- and two-apartment child has still during the next four years to encounter a risk which can be represented by 19 and 18 respectively compared with 14 and 10 in three- and four-apartment children. A consideration of the causes of death at these ages may throw some light on the factors which produce these differences.

CAUSES OF DEATH IN INFANCY.

If we represent the one-apartment infant death-rate by 100, then the two, three, and four and larger houses may be stated at 78, 61, and 49. Can this difference be ascribed wholly to housing conditions affecting the child directly? In the endeavour to find an answer I have taken out the rates for thirty separate causes of death, and two other groups to include cases where the causes of death were unknown, or were not further analysed.

It was submitted in evidence to the Committee on Physical Deterioration[1] that " in no single case has it ever been asserted that ill-nourished or unhealthy babies are more frequent at time of birth among the poor than among the rich. . . . The poorest and most ill-nourished women bring forth as hale and strong-looking babies as those in the very best conditions. In fact, it almost appears as though the unborn child fights strenuously for its own health at the expense of the mother and arrives in the world with a full chance of living a normal physical existence." If one applies to this the test which is afforded by the ability of the child to lead a separate existence apart from its mother, one finds, on the contrary, quite definite evidence, I think, that children do not enter life with an equal chance of surviving, and that the chances are least in the smallest size of house.

Among the causes of death of males under 1 year the rate for premature birth in *one*-apartment houses is equal to 30 per 1,000; in *two*- and *three*-apartments it is 24 and 25 respectively; in *four*-apartments 20, and in institutions 41. In the case of females the corresponding rates are 24, 21, 14, and 20; but the institution rate is 68 compared with 40 for females. These differences are not due to any direct influence which the smaller houses exert on the child after birth, but to a combination of influences acting on the mother during the ante-natal period at least, probably during the whole antecedent period of her life, and impairing, I believe, her own health and the vitality of her offspring.

---

[1] Minutes of Evidence, p. 31, question 556.

A priori one would have been disposed to suggest deficiency in food and rest as being included among the deteriorating influences directly affecting the mother. Experimental feeding of pregnant animals might be appealed to in favour of the suggestion of deficiency in food supply. Evidence of a more direct character is, however, available in an inquiry into the dietary of the labouring classes in Glasgow carried out during the past year by Miss Dorothy Lindsay, B.Sc., formerly Carnegie Research Fellow in the University of Glasgow, and contained in a report recently issued by the Corporation. Her observations bear so directly on the inadequacy of the dietary which prevails to an unknown extent among the population in whom the excessive death-rate from prematurity occurs, that I quote from her observations on sample dietaries in families with regular wages under 20s. per week.

Number of Study	Protein in grammes	Fat in grammes	Carbohydrate in grammes	Calories
XVII	103·0	63·5	467·9	2931·2
XXV	82·6	75·0	320·7	2351·0
XXVIII	96·4	67·8	423·2	2760·9
XLII	98·9	88·1	377·4	2772·2
LII	108·1	87·1	337·1	2635·3
Standard	120·0	100·0	500·0	3472·0

Miss Lindsay observes: "In this section, which embraces those who may properly be called poor, not one diet reaches the minimum energy value of 3,000 calories," and, she adds, "the children are nearly all small and light in weight." It is beside the point at the moment to inquire whether this insufficiency in dietary is concurrent with other causes of inefficiency in the parents; my purpose is rather to suggest that it constitutes a handicap on the life of the child at birth, and that it becomes of importance to discover whether this handicap is extinguished by the excessive death-rate from prematurity, or is reinforced by the external influences into which the child is born. Is there, in point of fact, any evidence that in the later period of childhood he is more prone to diseases which are not the mere accidents of infection than a child born under more favourable surroundings?

In Glasgow respiratory diseases are slightly more fatal to infant life than diseases of the digestive organs (29 and 28 per 1,000 births for male, and 24 and 21 for female infants), but I take the latter group first, because the diseases of which it is composed predominate from the second to the sixth month of life, and probably more accurately represent the field in which the child carries on the struggle for an independent existence. I place the rates for the diarrhœal group, and for other diseases of digestion separately, and combined.

MALES, AGED UNDER 1. DISEASES OF DIGESTION.

	Death-rate per 1,000		
	Diarrhœa or enteritis	Other digestive disorders	Both
1 apartment	25·32 = 100 ...	7·43 = 100 ...	32·75
2 ,, ...	19·72 ...	6·09 ...	25·81
3 ,, ...	10·48 ...	4·44 ...	14·92
4 ,, and upwards	12·02 = 47 ..	4·81 = 64 ...	16·83

The outstanding features of this comparison are, I think, the exaggerated prevalence of what may be regarded as the results of food infection in the smaller-sized houses, and the more uniform distribution of the rate ascribed to the other forms of diseases of the digestive organs. With regard to these latter, however, which may be regarded as due to a low standard of innervation, I suggest that part at least of the difference is consistent with a continuance of the handicap which in the earlier months of life found expression as prematurity because, while at ages 0 to 5 the excess in the smaller houses is quite marked, from 5 to 35, and again after 65, the relationship is reversed, and the higher rates tend to fall on the larger houses.

DISEASES OF THE NERVOUS SYSTEM.

This view gains some support, I think, from the variations which occur in the incidence of diseases of the nervous system other than non-tubercular meningitis and cerebral hæmorrhage, which latter is, however, not properly a disease of the nervous system at all.

Until the completion of the twentieth year in both sexes the higher rates tend to prevail in the smaller houses, but after this age there is an increasing tendency to find the one-apartment rates exceeded among the inhabitants of houses of other sizes, and to become associated with a change in the type of disease from the convulsive to the degenerative variety. Owing to the differences in age constitution, however, these variations are obscured in a statement of the rate at all ages.

MALES UNDER 1. DEATH-RATES FROM DISEASES OF NERVOUS SYSTEM.

	Meningitis (not tubercular)	Cerebral hæmorrhage	Other diseases of nervous system	All diseases of nervous system
1 apartment	3·74 ...	0·55 ...	9·77 ...	14·06
2 apartments	2·98 ...	0·13 ...	6·59 ..	9·70
3 ,, ...	2·54 ...	0·64 ...	5·08 ...	8·25
,, and upwards ...	3·21 ...	0·80 ..	7·21 ...	11·22

DISEASES OF THE ORGANS OF RESPIRATION.

In relation to house-incidence, the principal disease of this group—pneumonia—presents an almost complete contrast to the groups we have been considering. At each age-period almost without exception the higher rates fall on the houses of one and two apartments. It would therefore seem to be a disease entirely of environment and climatic conditions, resembling in its behaviour, indeed, those of a more definitely infectious type. In infancy the rate for the larger houses is equal to two-thirds that of one apartment, but a greater interval separates the rates from bronchitis, and is probably related to the increasing air impurity in houses of smaller size.

DISEASES OF RESPIRATORY ORGANS. MALES UNDER 1.

	Pneumonia	Bronchitis	Other diseases of respiratory organs	All diseases of respiratory organs
1 apartment	21·46	13·35	4·95	39·76
2 apartments	21·05	11·54	2 92	35·51
3 ,, ...	15 56	6·67	4·44	26·67
4 ,, and upwards ...	14·42	5·61	—	20·03

THE PRINCIPAL INFECTIOUS DISEASES OF CHILDHOOD.

For the purposes of this comparison I have selected the principal infectious diseases of childhood—viz., measles, whooping-cough, scarlet fever, diphtheria, membranous croup, and cerebrospinal fever.

MALES UNDER 1: DEATH-RATES PER 1,000.

	Measles (1)	Whooping-cough (2)	Scarlet fever (3)	Diphtheria and membranous croup (4)	Cerebro-spinal fever (5)	Total of columns 1, 2, 4	Com-parative number
1 apartment	11·70	10·46	0·28	1·10	0·28	23·26	= 100
2 apartments	9·57	7·42	0·32	1·01	0·51	18·00	—
3 ,, ...	3·49	5·71	0·32	0·95	—	10·15	—
,, and upwards	0·80	4·01	—	0·80	—	5·61	= 24

Males, 1-5: Death-rate per 1,000.

	Measles (1)	Whooping-cough (2)	Scarlet fever (3)	Diphtheria and membranous croup (4)	Cerebro-spinal fever (5)	Total of columns 1, 2, 3, 4	Comparative number
1 apartment	8·63	4·36	1·26	2·02	0·13	16·27	= 100
2 apartments	5·90	2·79	0·97	1·56	0·18	11·22	—
3 ,, ...	2·85	1·42	0·22	1·87	0·30	6·36	—
4 ,, and upwards	1·01	0·67	—	1·01	—	2·69	= 17

In order to cover the age-period of greatest susceptibility, I have included the ages 0-5, and in them there is a definite grading in relation to house-room with the exception of cerebrospinal fever, the house distribution of which (in the period under review) was apparently quite erratic. The rate of "all ages" was greatest in one-apartment houses, but no fatal cases occurred in them after the age-period 10-15: it was less than in two-apartment houses at ages 0-5; whereas fatal cases do not appear in houses of four apartments and upwards until the age-period 5-10, and they continue till the age-period 35-65.

Tuberculous Diseases.

In the circumstances of the movement considerable interest attaches to the house distribution of diseases of this class. From pulmonary tuberculosis the overhead reduction during the decade has been about 25 per cent., and this is fairly maintained in each class of house, save in four apartments and upwards. For both sexes the rates in 1901 and 1909-12 are as follows:—

Pulmonary Tuberculosis. All Ages. Death-rate per 1,000.

		1 apartment	2 apartments	3 apartments	4 apartments and upwards	All houses	Institutions, &c.	City
1901	Both sexes	2·4	1·8	1·2	0·7	—	7·4	1·8
1909-12		1·76	1·26	0·91	0·66	—	6·9	1·34
1909-12—								
Males ...		1·60	1·25	1·05	0·9	1·20	7·3	1·48
Females ...		1·90	1·27	0·78	0·49	1·11	6·4	1·21

Directly, however, we distinguish between the sexes we find that the female rate at all ages is higher than the male in houses of one and two apartments, and generally that in one-apartment houses it is below the male rate only at ages 20-25 and 45-75, and in two-apartment houses at ages 1-5, 20-25, and from 45 upwards. An excessive drift of male consumptives at these ages to parochial hospitals might tend somewhat to explain this excessive female incidence in houses, but there is no evidence of this in the institutional death-rate, which shows, indeed, a continuously excessive female rate at ages 5-55, save between 10 and 15, and again from 25-35.

In three- and four-apartment houses the rate for males of all ages exceeds that of females. In three-apartment houses, however, the female rate exceeds the rate at ages under 20, while in four apartments the female excess occurs only at the period 5-10, and again over 75. Applying the test of our standard population to these rates, the association with the house appears to be quite definite :—

CALCULATED DEATHS IN UNIFORM POPULATION.

Population		1 apartment	2 apartments	3 apartments	4 apartments	Institutions and shipping
Males	48,605	86	66	48	39	245
Females	51,395	102	70	39	22	327
Death-rate	100,000	188	136	87	61	572
Males only						
Tuberculous meningitis		15	15	14	10	18
Abdominal tuberculosis		12	10	7	3	11

I have placed the corresponding figures for tubercular meningitis and abdominal tubercle along with those relating to pulmonary tuberculosis because they seem to me to supply part at least of the answer to a question which frequently puzzled me—I mean the apparent lack of parallelism between the local distribution of pulmonary and the other forms of tuberculosis. When tested by the standard of a uniform population, however, they fall into line with the distribution of phthisis.

CANCER (MALIGNANT DISEASE).

The absence of association between new growths of a malignant character and housing, in the sense we are at present dealing with it, has not escaped attention in the past. In the present inquiry the rate for each sex at all ages in houses of three apartments and upwards is higher than in one and two apartments, but lower than in institutions.

At ages under 25 its distribution is irregular both in relation to age and housing, but it appears as a cause of death at every age-period thereafter and in every grade of house. At these ages the rate for males in one-apartments is lower than in larger houses, save from 35-55. In one-apartment females, the chief exception is at ages 45-55. In three-apartment females, the higher rates which properly belong to the later ages would appear to begin a decade earlier—i.e., at ages 35-45. The number of deaths in institutions, however, which cannot be allocated, but which occur among persons largely recruited from the one-apartment population, would probably affect the relationship of these rates.

SUMMARY.

In endeavouring to summarize the results of this inquiry it is pertinent to ask whether the several groups of population we have been considering can be regarded as in any way permanent sections of a population. I think the death-rates which prevail among them forbid an assumption of this character. They are too low. They are not the rates of a stationary population, but to my thinking suggest an ebb and flow of families caught in successive waves of good or evil fortune. This interchange we have seen is actually taking place to a recognizable extent in the case of the one- and two-apartment population and the Poor Law. To what extent it is also in progress between the occupants of three and four apartments and upwards there are no present means of determining. That they do occur is, I think, evident from the low range of death-rates which the larger sized houses present.

It may be urged that selective forces are in operation determining the movement of population in the direction of a particular size of house and that these rather than the surroundings in which they are recognized are the determining factors in the death-rate. I think the inquiry suggests that this is the case in certain diseases of digestion and of the nervous system. It is otherwise with regard to infectious disease. Here the element "house" predominates, I think, for the death-rates per 1,000 from the principal infectious diseases of childhood and pneumonia at ages 1-5 are sixteen and six for one-apartment houses, twelve and six for two-apartment houses, but only seven and two for three-apartment houses, and three and one for four apartments and upwards. Before reaching these ages, however, the children born in the smaller sized houses display evidence of a serious

TABLE I.—1909-1912. MALES—ONE-APARTMENT HOUSES. DEATH-RATES PER 1,000 FROM SEVERAL CAUSES AT VARIOUS AGE PERIODS.

Cause of death	Age —1	—5	—10	—15	—20	—25	—35	—45	—55	—65	—75	75+	All ages
(1) Smallpox	—	—	—	—	—	—	—	—	—	—	—	—	—
(2) Diphtheria and membranous croup ...	1·10	2·02	0·19	—	—	—	0·03	0·05	—	—	—	—	0·40
(3) Enteric fever	—	0·09	—	0·21	0·29	0·18	0·40	0·16	0·20	—	—	—	0·19
(4) Typhus fever	—	—	—	—	—	—	—	0·05	—	—	—	—	0·01
(5) Scarlet fever	0·28	1·26	0·26	—	—	—	—	—	—	—	—	—	0·23
(6) Cerebro-spinal fever	0·28	0·13	0·32	0·21	—	—	—	—	—	—	—	—	0·08
(7) Measles	11·70	8·63	0·45	—	—	—	—	—	—	—	—	—	1·95
(8) Whooping cough	10·46	4·36	0·19	—	—	—	—	—	—	—	—	—	1·21
(9) Diarrhœa and enteritis	25·32	2·70	0·13	—	—	—	—	0·16	0·10	—	0·65	—	1·73
(10) Other digestive diseases	7·43	0·67	0·26	0·10	0·15	0·27	0·29	0·54	1·29	2·22	0·97	—	0·87
(11) Puerperal fever	—	—	—	—	—	—	—	—	—	—	—	—	—
(12) Erysipelas	0·28	0 09	—	—	—	—	—	0·05	0·10	—	0 32	—	0·05
(13) Other septic diseases...	0·41	0·22	0·39	—	0·29	—	0·23	0 27	0·49	0·51	0·32	2·41	0·27
(14) Phthisis (pulmonary)	0·14	0·67	0·65	0·31	2·03	1·98	1·70	2·49	3·86	2·90	2·27	—	1·60
(15) Tuberculous meningitis	3·85	1·89	0·45	0·21	0·15	—	—	—	—	—	0·32	—	0·56
(16) Abdominal tuberculosis	2·75	1·30	0·19	0·21	0·15	0·09	0·03	—	—	—	—	—	0·39
(17) Other tuberculous diseases	2·61	0·58	0·45	0·31	0·29	0·36	0·12	—	0·10	0·34	0·65	—	0·39
(18) Cancer (malignant disease)	—	0 22	0·06	—	—	0·18	0·06	0·65	2·57	4·10	4·21	4·81	0·61
(19) Rheumatic fever	—	—	—	0·10	—	—	—	—	—	—	—	—	0·01
(20) Meningitis (not tuberculous)	3·71	1·12	0·39	0·10	0·15	0·18	0·06	—	0·10	—	0·65	—	0·46
(21) Cerebral hæmorrhage	0·55	0·07	0·06	—	—	—	—	0·38	1·38	4·44	10 68	9·63	0·65
(22) Other diseases of nervous system .	9.77	1·12	0·13	0·21	0·15	—	—	0·38	0·69	1·20	3·24	6·02	0·94
(23) Circulatory diseases	2·61	0·22	0 19	0·31	0·44	0·36	0·52	1·57	5·14	8·54	16·83	32·49	1·82
(24) Pneumonia	21·46	6·34	0·45	0·41	0·15	0·72	0·40	2·28	4·25	3·08	4·85	1·20	3·09
(25) Bronchitis	13·35	2·52	0·13	—	—	0·09	0·12	0·54	2·77	5·30	17·47	13·24	2·02
(26) Other respiratory diseases	4·95	0·36	0·06	—	0 29	—	0·09	0·27	0·49	0·51	0·32	1·20	0·45
(27) Croup	0·28	0·27	—	—	—	—	—	—	—	—	—	—	0·05
(28) Influenza	0·14	0·07	—	—	—	—	—	—	—	—	—	2·41	0·03
(29) Violence	4·13	1·21	0·66	1·13	0·29	0·63	0·42	1·14	1·58	1·37	2·91	—	1·07
(30) Premature births	30·13	—	—	—	—	—	—	—	—	—	—	—	1·50
(31) Unknown	1·65	0·09	—	—	—	—	0·03	0·11	0·20	0·17			0 11
(32) All others	50·91	2·34	0·91	0 72	—	0·18	0·61	1·46	3·87	6·49	18·45	32·19	4·19
All causes	210·25	40·56	6·97	1·54	4·82	5·24	5·11	12·55	29·18	41·17	85·11	105·90	27·26
Deaths	1,528	902	108	44	33	58	177	232	295	241	263	88	3,969
Census population (× 3) ...	7,266	22,239	15,495	9,693	6,852	11,055	31,650	18,477	10,110	5,853	3,090	831	145,611

TABLE II.—1909-1912 MALES—TWO-APARTMENT HOUSES. DEATH-RATES PER 1,000 FROM SEVERAL CAUSES AT VARIOUS AGE PERIODS.

Causes of death	Age												
	–1	–5	–10	–15	–20	–25	–35	–45	–55	–65	–75	75–	All ages
(1) Smallpox	—	—	—	—	—	—	—	—	—	—	—	—	—
(2) Diphtheria and membranous croup ...	1·01	1·56	0·46	0·09	—	0·05	0·01	—	—	—	—	—	0·28
(3) Enteric fever ...	—	0·03	0·04	0·09	0·06	0·10	0·25	0·12	0·11	0·05	—	—	0·10
(4) Typhus fever ...	—	—	—	—	—	0·02	—	0·01	—	—	—	—	0·00
(5) Scarlet fever	0·32	0·97	0·36	0·06	—	0·02	0·02	0·01	—	—	0·11	—	0·18
(6) Cerebro-spinal fever	0·51	0·18	0·10	—	—	—	0·01	—	—	—	—	—	0·05
(7) Measles	9·57	5·90	0·38	—	—	—	—	—	—	—	—	—	0·99
(8) Whooping cough	7·42	2·79	0·11	—	—	—	—	—	—	—	—	—	0·51
(9) Diarrhœa and enteritis ..	19·72	1·59	0·10	0·02	0·06	0·05	0·02	0·03	0·22	0·27	0·74	1·15	0·82
(10) Other digestive diseases	6·09	0·60	0·42	0·32	0·31	0·17	0·31	0·52	0·72	1·59	2·55	5·15	0·69
(11) Puerperal fever	—	—	—	—	—	—	—	—	—	—	—	—	—
(12) Erysipelas	0·32	0·02	—	—	—	—	0·02	0·04	0·13	0·18	0·74	—	0·05
(13) Other septic diseases...	0·57	0·10	—	0·22	0·09	0·05	0·01	0·06	0·09	0·41	0·53	—	0·11
(14) Phthisis (pulmonary)	0·38	0·54	0·31	0·57	1·25	2·49	1·74	1·67	2·00	1·96	1·17	—	1·25
(15) Tuberculous meningitis	4·82	1·64	0·34	0·19	0·13	0·05	0·01	—	0·02	—	—	—	0·41
(16) Abdominal tuberculosis	2·22	0·96	0·44	0·16	0·04	0·02	0·02	0·01	—	0·05	—	—	0·26
(17) Other tuberculous diseases	1·01	0·50	0·18	0·17	0·17	0·27	0·06	0·06	0·18	0·09	0·21	—	0·21
(18) Cancer (malignant disease)	—	0·02	—	0·05	0·04	0·02	0·16	0·63	2·10	4·78	6·27	7·45	0·62
(19) Rheumatic fever	—	0·03	0·01	0·02	0·02	0·02	—	0·04	0·02	—	—	—	0·02
(20) Meningitis (not tuberculous)	2·98	1·02	0·21	0·05	0·08	0·02	0·02	0·04	0·04	0·05	—	—	0·26
(21) Cerebral hæmorrhage	0·13	0·05	—	0·02	0·02	0·02	0·06	0·14	0·90	3·82	8·40	20·62	0·48
(22) Other diseases of nervous system ...	6·59	1·15	0·16	0·09	0·15	0·07	0·17	0·18	0·65	0·86	3·30	5·15	0·58
(23) Circulatory diseases	2·09	0·18	0·19	0·25	0·46	0·61	0·46	1·34	3·12	7·15	16·59	28·06	1·40
(24) Pneumonia	21·05	5·75	0·49	0·21	0·27	0·37	0·50	1·20	2·83	4·00	6·16	7·45	2·16
(25) Bronchitis	11·54	1·19	0·08	0·02	0·06	0·15	0·18	0·36	1·64	5·42	11·27	23·48	1·19
(26) Other respiratory diseases	2·92	0·26	0·03	0·03	0·02	0·10	0·07	0·27	0·36	0·68	0·74	1·72	0·25
(27) Croup	1·71	0·21	0·01	—	—	—	—	—	—	—	—	—	0·07
(28) Influenza	0·25	0·06	0·01	—	—	—	0·03	0·03	0·22	0·27	0·42	—	0·06
(29) Violence	1·84	0·93	0·36	0·17	0·27	0·32	0·53	1·19	1·37	1·82	1·91	4·01	0·75
(30) Premature births	24·34	—	—	—	—	—	—	—	—	—	—	—	0·70
(31) Unknown	1·08	0·02	0·01	—	—	—	0·01	0·06	0·16	0·09	0·21	—	0·06
(32) All others	33·40	1·95	0·73	0·46	0·44	0·41	0·72	1·00	2·40	6·15	14·78	53·83	2·53
All causes	163·88	30·20	5·56	3·16	3·94	5·40	5·42	9·01	19·30	39·69	76·12	158·07	17·07
Deaths	2,585	1,859	407	200	205	222	474	700	860	872	716	276	9,376
Census population (× 3) ...	15,774	61,512	73,140	63,228	52,077	11,001	87,369	77,622	44,526	21,969	9,405	1,746	549,399

TABLE III.—1909-1912. MALES—THREE-APARTMENT HOUSES. DEATH-RATES PER 1,000 FROM SEVERAL CAUSES AT VARIOUS AGE PERIODS.

Cause of death	Age												
	—1	—5	—10	—15	—20	—25	—35	—45	—55	—65	—75	75+	All ages
(1) Smallpox	—	—	—	—	—	—	—	—	—	—	—	—	—
(2) Diphtheria and membranous croup ...	0·95	1·87	0·70	0·12	0·03	—	—	—	—	—	—	—	0·20
(3) Enteric fever	—	—	0·05	—	0·07	—	0·20	0 07	0·08	0·06	—	—	0·06
(4) Typhus fever	—	—	—	—	—	—	—	—	0·04	—	—	—	0·00
(5) Scarlet fever	0·32	0·22	0·19	0·12	0·03	0·04	—	—	—	—	—	—	0·06
(6) Cerebro-spinal fever	—	0·30	—	—	0·03	0·04	—	0·03	—	—	—	—	0·03
(7) Measles	3·49	2·85	0·19	—	—	—	—	—	—	—	—	—	0·23
(8) Whooping cough	5·71	1·42	0·05	—	—	—	—	—	—	—	—	—	0·16
(9) Diarrhœa and enteritis	10·48	1·12	0·05	—	0·03	—	0·03	0·07	0·04	0·31	0·94	4·66	0·30
(10) Other digestive diseases	4·44	0·45	0·24	0·26	0·23	0·29	0·34	0·24	0·66	1·38	0·94	1·55	0·48
(11) Puerperal fever	—	—	—	—	—	—	—	—	—	—	—	—	—
(12) Erysipelas	1·27	—	—	—	—	0·04	—	—	0·19	0·13	0·16	—	0·06
(13) Other septic diseases	—	—	—	0·04	0·10	—	—	0·07	—	0·06	0·16	—	0·03
(14) Phthisis (pulmonary)	0·32	0·30	0·05	0·19	0·86	1·33	1·68	1·02	2·07	1·57	0·79	—	1·05
(15) Tuberculous meningitis	2·54	1·79	0·14	0·12	0·27	0·07	—	0·03	0·04	0·06	0·16	—	0·22
(16) Abdominal tuberculosis	0·63	0·82	0·24	0·12	—	0·07	0·05	0·03	—	0·06	—	—	0·12
(17) Other tuberculous diseases	0·32	0·30	0·19	0·16	0·17	0·07	0·08	0·21	0·12	0·19	—	—	0·15
(18) Cancer (malignant disease)	—	—	0 09	—	0·03	0·04	0·25	0·49	1·21	4·01	8·64	6·22	0·79
(19) Rheumatic fever	—	—	—	—	0·03	0·04	—	—	0·04	0·06	0·16	—	0·02
(20) Meningitis (not tuberculous)	2·54	0·60	0·05	0·08	0·03	—	0·06	0·07	—	—	—	—	0·10
(21) Cerebral hæmorrhage	0·63	—	—	0·04	—	0·07	0·11	0·10	0·98	3·51	8·65	17·87	0·73
(22) Other diseases of nervous system ...	5·08	0·67	0·19	0·04	0·10	0·04	0·14	0·24	0·58	0·81	3·46	9·32	0·46
(23) Circulatory diseases	3·49	0·30	0·09	0·23	0·27	0·25	0·28	1·16	2·38	5·20	15·24	18·65	1.47
(24) Pneumonia	15·56	2·25	0·24	0·12	0·27	0·47	0·56	1·05	1·95	2·75	2·83	3·11	1·17
(25) Bronchitis	6·67	0·97	—	—	—	0·04	0·11	0·14	1·01	2·88	7·55	12·43	0·76
(26) Other respiratory diseases	4 44	0·15	—	0·04	—	0·07	0·03	0·24	0·43	0;56	1·26	0·78	0·24
(27) Croup	—	0·07	0·05	—	—	—	—	—	0·04	—	—	—	0·01
(28) Influenza	0·32	0·07	—	—	0·03	—	—	—	0·08	0·44	0·79	1·55	0·08
(29) Violence	1·27	0·30	0·28	0·08	0·13	0·22	0·42	0·88	0·86	0·69	0·63	1·55	0·45
(30) Premature births	25·40	—	-	—	—	—	—	—	—	—	—	—	0·34
(31) Unknown	—	0·07	—	—	—	—	—	0·07	—	0·06	0·16	0·78	0·02
(32) All others	32·38	1·05	0·41	0·42	0·43	0·62	0·56	1·40	1·83	4·70	11·63	67·60	2·17
All causes	128·25	17·94	3·49	2·18	3·14	3·81	4·90	7·61	14·63	29·49	64·15	146·07	11·96
Deaths	401	240	74	56	95	105	175	217	375	471	408	188	2,808
Census population (× 3) ...	3,150	13,377	21,273	25,644	30,171	27,549	35,718	28,521	25,626	15,972	6,360	1,287	234,648

TABLE IV.—1909-1912. MALES—FOUR-APARTMENT HOUSES AND UPWARDS. DEATH-RATES PER 1,000 FROM SEVERAL CAUSES AT VARIOUS AGE PERIODS.

Cause of death	Age												
	1	−5	−10	−15	−20	−25	−35	−45	−55	−65	−75	75+	All ages
(1) Smallpox	—	—	—	—	—	—	—	—	—	—	—	—	—
(2) Diphtheria and membranous croup ...	0·80	1·01	0·30	0·08	—	—	—	—	—	—	—	—	0·07
(3) Enteric fever	—	—	0·10	0·08	0·16	—	0·03	0·10	—	0·07	—	—	0·06
(4) Typhus fever	—	—	—	—	—	—	—	0·05	—	—	—	—	0·01
(5) Scarlet fever	—	—	0·77	0·21	0·05	—	0·03	—	—	—	—	—	0·08
(6) Cerebro-spinal fever	—	—	0·20	0·08	0·05	—	—	0·05	0·05	0·07	—	—	0·01
(7) Measles	0·80	1·01	0·30	—	—	—	—	—	—	—	0·14	—	0·07
(8) Whooping cough	1·01	0·67	0·20	—	—	—	—	—	—	—	—	—	0·07
(9) Diarrhœa and enteritis ...	12·02	0·50	0·20	—	0·16	0·09	0·11	0·29	0·42	0·14	0·28	1·68	0·31
(10) Other digestive diseases ...	4·81	—	0·10	0·15	0·16	0·21	0·49	0·39	1·14	1·22	3·23	5·05	0·68
(11) Puerperal fever	—	—	—	—	—	—	—	—	—	—	—	—	—
(12) Erysipelas	0·80	—	—	—	—	—	0·03	—	0·10	—	0·14	—	0·03
(13) Other septic diseases	0·80	—	—	—	—	—	0·03	—	—	0·14	0·14	0·56	0·01
(14) Phthisis (pulmonary) ...	—	0·34	0·10	0·15	0·53	1·04	1·29	1·66	1·08	0·88	0·56	—	0·90
(15) Tuberculous meningitis ...	2·40	1·35	0·20	0·15	0·11	—	—	—	—	—	—	—	0·10
(16) Abdominal tuberculosis ...	—	0·50	—	0·08	—	—	0·03	0·05	—	—	—	—	0·04
(17) Other tuberculous diseases ...	1·60	0·34	—	0·08	0·11	0·19	0·11	0·10	—	0·14	—	—	0·12
(18) Cancer (malignant disease) ...	—	0·17	0·10	—	—	0·09	0·21	0·24	1·30	3·53	8·15	9·54	1·03
(19) Rheumatic fever	—	—	—	—	—	—	0·03	—	—	0·07	—	—	0·01
(20) Meningitis (not tuberculous) ...	3·21	0·84	0·10	0·15	0·11	—	—	0·05	0·10	—	—	—	0·10
(21) Cerebral hæmorrhage ...	0·80	—	0·10	—	—	—	—	0·15	0·78	2·03	7·03	14·03	0·77
(22) Other diseases of nervous system ..	7·21	0·34	—	—	0·05	0·19	0·10	0·44	0·62	1·35	2·81	11·78	0·62
(23) Circulatory diseases	1·60	—	0·10	0·15	0·32	0·24	0·39	1·07	2·22	6·16	15·76	33·68	2·18
(24) Pneumonia	14·42	1·35	0·20	0·15	0·16	0·24	0·39	1·32	1·40	2·17	4·92	4·49	1·09
(25) Bronchitis	5·61	0·17	0·10	—	—	—	0·03	0·20	0·62	1·83	6·61	11·78	0·74
(26) Other respiratory diseases ...	—	0·34	—	—	0·11	0·09	0·03	0·20	0·26	0·47	0·84	2·24	0·20
(27) Croup	0·80	0·17	—	—	—	—	—	—	—	—	—	—	0·01
(28) Influenza	—	—	—	—	—	—	—	—	0·05	0·31	0·84	1·68	0·09
(29) Violence	—	0·17	0·30	0·08	0·26	0·14	0·17	0·68	0·52	0·75	1·12	2·24	0·40
(30) Premature births	20·04	—	—	—	—	—	—	—	—	—	—	—	0·15
(31) Unknown	0·80	—	—	—	—	—	—	0·05	0·05	0·20	—	—	0·04
(32) All others	20·04	1·00		0·21	0·37	0·42	0·36	1·42	3·78	6·23	14·90	58·37	2·84
All causes	102·57	10·27	3·47	1·80	2·71	2·97	3·92	8·50	14·49	27·79	67·47	157·12	12·89
Deaths	128	61	35	24	51	63	113	174	279	410	480	280	2,098
Census population (× 3) ...	1,248	5,946	10,086	13,299	18,810	21,219	28,725	20,475	19,266	14,751	7,113	1,782	162,720

TABLE V.—1909-1912. MALES—INSTITUTIONS AND HARBOUR. DEATH RATES PER 1,000 FROM SEVERAL CAUSES AT VARIOUS AGE PERIODS.

Cause of death	AGE												
	—1	—5	—10	—15	—20	—25	—35	—45	—55	—65	—75	75+	All ages
(1) Smallpox	—	—	—	—	—	—	—	—	—	—	—	—	—
(2) Diphtheria and membranous croup ...	—	0·67	—	—	—	—	—	—	—	—	—	—	0·02
(3) Enteric fever	—	—	—	—	—	0·20	0·20	0·19	—	0·16	—	—	0·12
(4) Typhus fever	—	—	—	—	—	—	—	—	—	—	—	—	—
(5) Scarlet fever	—	1·35	—	—	0·43	—	—	—	—	—	—	—	0·06
(6) Cerebro-spinal fever	—	—	—	—	0·43	—	—	—	—	—	—	—	0·02
(7) Measles	11·11	14·16	1·09	—	—	—	—	—	—	—	—	—	0·50
(8) Whooping cough	—	0·67	—	—	—	—	—	—	—	—	—	—	0·02
(9) Diarrhœa and enteritis	107·41	13·51	—	—	—	—	0·10	—	0·23	—	—	1·41	1·03
(10) Other digestive diseases	11·11	2·02	—	—	0·43	0·20	0·50	0·48	0·35	0·81	1·16	2·82	0·62
(11) Puerperal fever	—	—	—	—	—	—	—	—	—	—	—	—	—
(12) Erysipelas	—	—	—	—	—	—	—	—	0·23	0·16	0·29	2·82	0·12
(13) Other septic diseases	—	—	—	—	—	—	0·20	0·19	0·23	0·33	0·87	1·41	0·23
(14) Phthisis (pulmonary)	3·70	0·67	—	1·27	2·55	4·25	6·66	8·58	8·96	11·89	10·11	5·65	7·26
(15) Tuberculous meningitis	14·82	—	—	—	—	—	—	0·10	—	—	—	—	0·10
(16) Abdominal tuberculosis	—	0·67	1·64	—	—	—	—	—	—	—	—	—	0·08
(17) Other tuberculous diseases	33·33	4·05	7·12	0·64	1·28	0·20	0·30	0·67	0·59	0·49	0·87	—	1·05
(18) Cancer (malignant disease)	—	—	—	0·64	—	—	—	0·29	2·12	4·72	6·64	5·65	1·51
(19) Rheumatic fever	—	—	—	—	—	—	—	—	—	—	—	—	—
(20) Meningitis (not tuberculous)	—	—	—	0·64	—	—	0·10	0·10	—	—	—	—	0·06
(21) Cerebral hæmorrhage	—	—	—	—	—	—	0·30	0·19	2·47	6·35	12·71	15·54	2·33
(22) Other diseases of nervous system ..	—	0·67	1·09	—	—	0·20	0·40	0·87	1·53	1·30	2·60	7·06	1·01
(23) Circulatory diseases	3·70	0·67	—	0·64	0·43	1·01	1·11	2·12	2·12	13·69	32·64	88·97	6·21
(24) Pneumonia	25·93	2·70	—	0·64	—	0·61	1·01	2·80	4·01	7·00	10·69	7·06	3·36
(25) Bronchitis	29·63	6·75	—	—	—	0·20	—	0·77	2·24	6·51	17·62	24·01	3·18
(26) Other respiratory diseases	—	—	—	—	—	—	—	0·38	0·23	0·81	1·44	5·65	0·39
(27) Croup	—	—	—	—	—	—	—	—	—	—	—	—	—
(28) Influenza	—	—	—	—	—	—	—	—	—	—	—	—	—
(29) Violence	—	—	—	—	0·85	0·40	0·61	1·75	1·88	2·28	2·31	1·41	1·30
(30) Premature births	40·74	—	—	—	—	—	—	—	—	—	—	—	0·21
(31) Unknown	—	—	—	—	—	—	0·20	0·19	0·35	0·65	0·58	1·41	0·27
(32) All others	92·59	3·37	2·19	1·27	—	0·40	1·41	1·83	5·43	10·10	19·34	63·53	5·65
All causes	374·07	51·95	13·13	5·74	6·40	7·67	13·10	21·50	32·97	67·25	119·87	234·45	36·71
Deaths	101	77	24	9	15	38	130	223	280	413	415	166	1,891
Census population (× 3) ...	270	1,482	1,827	1,569	2,343	4,950	9,918	10,374	8,490	6,141	3,462	708	51,534
City (all males)	**171·29**	**30·01**	**5·32**	**2·94**	**3·62**	**4·59**	**5·44**	**9·94**	**19·34**	**37·21**	**77·54**	**157·07**	**17·61**
Deaths	4,746	3,139	618	333	399	486	1,069	1,546	2,089	2,407	2,282	998	20,142
Census population (× 3) ...	27,708	104,586	121,821	113,433	110,253	105,774	196,380	155,469	108,018	64,686	29,430	6,354	1,143,912

TABLE VI.—1909-1912. FEMALES—ONE-APARTMENT HOUSES. DEATH-RATES PER 1,000 FROM SEVERAL CAUSES AT VARIOUS AGE PERIODS.

Causes of death	Age												
	–1	–5	–10	–15	–20	–25	–35	–45	–55	–65	–75	75+	All ages
(1) Smallpox	—	—	—	—	—	—	—	—	—	—	—	—	—
(2) Diphtheria and membranous croup ...	1·23	1·83	0·51	—	—	—	0·03	—	—	—	—	—	0·35
(3) Enteric fever	—	—	0·06	0·10	—	0·06	0·18	0·05	0·08	—	—	—	0·07
(4) Typhus fever	—	—	—	—	—	—	—	—	—	—	—	—	—
(5) Scarlet fever	0·41	1·03	0·51	—	—	—	—	—	—	—	—	—	0·20
(6) Cerebro-spinal fever ...	0·69	0·09	0·06	—	—	—	0·03	—	—	—	—	—	0·05
(7) Measles .. .	7·68	7·85	0·57	—	—	—	—	—	—	—	—	—	1·43
(8) Whooping cough	10·84	4·10	0·13	0·10	—	—	—	—	—	—	—	—	1·03
(9) Diarrhœa and enteritis	19·62	2·63	0·13	0·20	—	0·06	0·05	—	0·15	0·44	0·89	2·53	1·35
(10) Other digestive diseases	5·08	0·62	0·13	0·42	0·23	0·22	0·18	0·64	0·86	1·65	1·94	2·11	0·75
(11) Puerperal fever ...	—	—	—	—	0·35	0·60	0·55	0·54	0·08	—	—	—	0·27
(12) Erysipelas	0·41	0·04	—	—	0·12	0·16	—	0·16	0·15	0·33	0·15	—	0·10
(13) Other septic diseases ...	0·27	0·13	—	0·20	0·12	0·44	0·26	0·38	0·23	0·22	—	0·42	0·23
(14) Phthisis (pulmonary)	0·96	0·67	0.57	1·33	2·10	1·96	2·32	4·04	2·97	1·43	0·74	1·26	1·90
(15) Tuberculous meningitis	2·47	1·38	0·51	—	0·12	—	0·03	0·05	—	—	—	—	0·36
(16) Abdominal tuberculosis	1·37	1·07	0·57	0·20	0·23	0·11	0·05	0·20	—	—	—	—	0·33
(17) Other tuberculous diseases	0·82	0·75	0·57	0·30	0·23	0·22	0·05	0·11	0·08	—	—	0·42	0·28
(18) Cancer (malignant disease) ..	—	—	—	0·10	—	0·06	0·26	0·86	3·50	4·40	6·26	2·53	0·96
(19) Rheumatic fever	—	—	0·06	—	—	—	—	0·05	—	0·11	—	—	0·02
(20) Meningitis (not tuberculous) ...	3·15	0·89	0·25	—	0·12	—	—	0·11	0·08	—	0·15	—	0·31
(21) Cerebral hæmorrhage	0·27	0·04	—	—	—	—	0·13	0·54	1·71	2·97	6·26	7·16	0·75
(22) Other diseases of nervous system ..	8·92	0·94	0·06	0·20	0·12	0·05	0·16	0·32	0·39	1·54	1·34	1·26	0·80
(23) Circulatory diseases ...	1·10	0·13	0·13	—	0·46	0·49	0·68	1·83	4·82	6·38	13·26	13·48	1·91
(24) Pneumonia	17·83	7·14	0·70	0·30	—	0·33	0·47	0·18	2·64	2·31	3·13	4·64	2·52
(25) Bronchitis ..	12·07	2·05	0·19	—	0·12	0·05	0·26	0·86	4·05	8·24	12·37	18·54	2·49
(26) Other respiratory diseases	2·47	0·35	0·13	—	0·12	0·05	0·05	0·32	0·62	1·10	0·89	1·26	0·39
(27) Croup .	0·14	0·22	—	—	—	—	—	—	—	—	—	—	0·03
(28) Influenza	—	—	—	—	—	0·05	—	—	0·08	—	—	—	0·01
(29) Violence ..	3·57	1·25	0·70	0·30	0·35	—	0·13	0·75	0·93	1·10	1·19	2·53	0·75
(30) Premature births ...	24·28	—	—	—	—	—	—	—	—	—	—	—	1·05
(31) Unknown	1·37	0·04	—	—	0·12	—	0·08	0·11	0·31	0·22	0·30	—	0·15
(32) All others	36·62	2·23	0·38	0·71	0·70	0·98	1·40	2·42	3·11	4·81	12·22	25·71	4·03
All causes	163·64	37·47	6·92	4·16	5·61	5·89	7·37	14·86	26·84	37·28	61·09	83·85	24·90
Deaths	1,193	841	109	44	48	108	280	276	345	339	410	199	4,192
Census population (× 3)	7,290	22,137	15,720	9,870	8,556	18,324	36,510	18,573	12,855	9,093	6,711	2,373	168,312

TABLE VII.—1909-1912. FEMALES—TWO-APARTMENT HOUSES. DEATH-RATES PER 1,000 FROM SEVERAL CAUSES AT VARIOUS AGE PERIODS.

Cause of death	Age												
	—1	—5	—10	—15	—20	—25	—35	—45	—55	—65	—75	75+	All ages
(1) Smallpox	—	—	—	—	—	—	—	—	—	—	—	—	—
(2) Diphtheria and membranous croup ...	0·89	1·82	0·50	0·08	—	—	—	—	0·02	—	—	—	0·30
(3) Enteric fever	0·06	0·02	0·04	0·02	—	0·07	0·17	0·09	—	—	—	—	0·06
(4) Typhus fever	—	—	—	—	—	0·02	—	0·01	0·02	—	—	—	0·01
(5) Scarlet fever	0·32	0·95	0·39	0·05	0·06	0·05	0·03	0·03	—	—	—	—	0·19
(6) Cerebro-spinal fever	0·57	0·16	0·05	0·03	—	0·02	0·01	—	—	—	—	—	0·05
(7) Measles	5·78	5·41	0·46	0·01	—	—	0·01	—	—	—	—	—	0·83
(8) Whooping cough	8·26	2·93	0·20	—	—	—	—	—	—	—	—	—	0·59
(9) Diarrhœa and enteritis	13·20	1·69	0·12	0·01	—	—	—	0·05	0·21	0·16	0·94	1·72	0·65
(10) Other digestive diseases	3·56	0·39	0·15	0·19	0·18	0·20	0·33	0·47	0·76	1·31	1·88	5·72	0·53
(11) Puerperal fever	—	—	—	—	0·06	0·27	0·31	0·40	—	—	—	—	0·13
(12) Erysipelas	0·25	—	—	—	0·02	—	—	0·05	0·14	0·08	0·22	0·86	0·04
(13) Other septic diseases...	0·32	0·03	0·03	0·09	0·02	0·10	0·10	0·17	0·12	0·33	0·22	—	0·10
(14) Phthisis (pulmonary)	0·38	0·46	0·41	0·62	1·79	2·13	1·93	2·06	1·59	0·98	0·58	—	1·27
(15) Tuberculous meningitis	2·60	1·55	0·49	0·16	0·10	0·02	0·03	0·01	—	—	—	—	0·35
(16) Abdominal tuberculosis	1·65	0·57	0·34	0·22	0·16	0·10	0·05	0·04	0·07	—	0·07	—	0·22
(17) Other tuberculous diseases	1·90	0·51	0·24	0·19	0·20	0·20	0·09	0·09	0·09	—	—	—	0·23
(18) Cancer (malignant disease)	0·13	—	0·01	—	0·02	0·12	0·25	0·74	3·02	6·61	7·29	8·58	0·92
(19) Rheumatic fever	—	—	0·01	0·01	—	—	0·01	0·01	—	—	—	—	0·01
(20) Meningitis (not tuberculous)	1·71	0·61	0·27	0·11	0·02	0·02	—	0·01	0·05	—	0·07	—	0·18
(21) Cerebral hæmorrhage	0·32	0·03	0·01	0·02	0·06	—	0·07	0·35	1·20	3·82	8·73	9·44	0·62
(22) Other diseases of nervous system ...	6·73	0·69	0·15	0·08	0·12	0·15	0·12	0·23	0·55	0·82	2·09	5·15	0·53
(23) Circulatory diseases	1·08	0·05	0·22	0·38	0·46	0·52	0·85	1·46	3·00	6·28	11·91	19·46	1·45
(24) Pneumonia	15·94	4·96	0·36	0·30	0·22	0·40	0·46	0·74	1·52	2·79	3·97	4·86	1·68
(25) Bronchitis	6·35	1·43	0·05	0·05	0·04	0·07	0·23	0·40	1·82	5·62	12·34	20·60	1·28
(26) Other respiratory diseases	2·80	0·21	0·09	0·02	0·06	0·05	0·17	0·26	0·30	0·82	1·08	2·00	0·29
(27) Croup	0·63	0·18	0·01	—	—	—	—	—	—	—	0·07	—	0·04
(28) Influenza	0·25	0·08	0·03	—	—	—	0·01	0·01	0·09	0·25	0·58	0·86	0·06
(29) Violence	1·46	0·64	0·18	0·14	0·10	0·05	0·12	0·25	0·78	0·53	1·44	2·00	0·35
(30) Premature births	21·22	—	—	—	—	—	—	—	—	—	—	—	0·60
(31) Unknown	0·63	0·02	0·03	—	—	0·05	0·01	0·04	0·02	—	0·14	—	0·04
(32) All others	24·32	1·33	0·34	0·36	0·26	0·96	1·14	1·78	3·02	4·96	13·86	43·78	2·52
All causes	123·31	26·75	5·18	3·14	3·95	5·57	6·50	9·75	18·39	35·36	67·48	125·03	16·12
Deaths	1,942	1,628	384	199	200	224	574	728	798	862	935	437	8,911
Census population (× 3) ...	15,741	60.837	74,001	63,375	50,577	40,161	88,263	74,559	43,383	24,375	13,857	3,495	552,624

TABLE VIII.—1909-1912. FEMALES—THREE APARTMENT HOUSES—DEATH-RATES PER 1,000 FROM SEVERAL CAUSES AT VARIOUS AGE PERIODS.

Cause of death	Age												
	−1	−5	−10	−15	−20	−25	−35	−45	−55	−65	−75	75+	All ages
(1) Smallpox ...	—	—	—	—	—	—	—	—	—	—	—	—	—
(2) Diphtheria and membranous croup ...	0·33	1·30	0·58	0·19	—	—	0·03	—	0·04	—	—	—	0·15
(3) Enteric fever ...	—	0·07	—	—	0·07	0·07	0·05	—	0·07	—	—	—	0·04
(4) Typhus fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—
(5) Scarlet fever ...	0·33	0·72	0·24	0·11	—	0·04	—	—	—	—	0·12	—	0·08
(6) Cerebro-spinal fever ...	0·33	—	0·05	—	0·03	—	—	—	—	—	—	—	0·01
(7) Measles ...	5·35	2·02	0·10	—	—	—	0·03	—	—	—	—	—	0·19
(8) Whooping cough ...	4·35	1·37	0·10	—	—	—	—	—	—	—	—	—	0·14
(9) Diarrhœa and enteritis	10·37	0·94	0·21	0·04	0·03	—	0·05	0·19	0·17	0·30	0·98	0·30	0·33
(10) Other digestive diseases ...	5·02	0·07	0·24	0·26	0·20	0·18	0·27	0·45	0·53	1·18	1·59	3·03	0·18
(11) Puerperal fever ...	—	—	—	—	0·07	0·18	0·08	0·16	—	—	—	—	0·06
(12) Erysipelas ...	0·33	—	—	—	0·03	—	—	—	0·04	—	—	—	0·01
(13) Other septic diseases ...	—	—	0·14	—	0·10	—	0·13	0·03	0·04	0·12	0·61	0·86	0·09
(14) Phthisis (pulmonary) ...	0·33	0·29	0·29	0·34	1·06	1·28	1·28	0·80	0·77	0·59	0·12	—	0·78
(15) Tuberculous meningitis ...	3·35	1·01	0·10	0·04	—	—	—	—	—	—	—	—	0·11
(16) Abdominal tuberculosis ...	0·67	0·72	0·21	0·15	0·13	—	0·03	0·16	0·04	—	—	—	0·13
(17) Other tuberculous diseases ...		0·07	0·19	0·04	0·13	0·11	0·08	0·06	0·07	0·12	0·24	—	0·10
(18) Cancer (malignant disease) ...	—	—	—	—	—	—	0·27	1·07	2·21	5·91	8·67	9·51	1·22
(19) Rheumatic fever ...	—	—	—	0·04	0·03	—	—	—	—	—	—	—	0·01
(20) Meningitis (not tuberculous) ...	3·35	0·72	0·19	—	0·07	—	—	0·06	0·04	—	—	—	0·12
(21) Cerebral hæmorrhage ...	0·67	—	—	—	0·03	—	0·05	0·26	0·56	2·42	6·47	12·11	0·61
(22) Other diseases of nervous system ...	4·35	0·72	—	0·07	0·07	0·26	0·22	0·19	0·21	6·89	3·30	6·92	0·46
(23) Circulatory diseases ...	0·67	0·07	0·24	0·11	0·23	0·44	0·49	0·96	1·69	3·42	8·79	22·05	1·28
(24) Pneumonia ...	15·07	2·24	0·38	0·19	0·10	0·07	0·30	0·18	0·46	1·77	3·54	7·35	0·85
(25) Bronchitis ...	7·04	0·51	0·05	—	0·13	0·07	0·03	0·06	0·70	2·30	7·94	18·59	0·83
(26) Other respiratory diseases ...	1·67	0·22	0·05	0·11	0·03	0·01	0·08	0·10	0·14	0·47	0·37	3·46	0·18
(27) Croup ...	—	0·22	—	—	—	—	—	—	—	—	—	0·43	0·02
(28) Influenza ...	0·33	0·07	—	—	—	—	0·03	0·03	0·07	0·30	0·37	2·16	0·08
(29) Violence ...	1·00	0·29	0·38	0·08	0·13	0·11	—	0·19	0·25	0·24	0·12	1·73	0·19
(30) Premature births ...	14·39	—	—	—	—	—	—	—	—	—	—	—	0·17
(31) Unknown ...	—	—	0·05	—	—	—	0·03	—	—	0·06	0·12	—	0·02
(32) All others ...	21·77	1·16	0·19	0·26	0·20	0·55	0·79	1·68	2·07	4·90	11·11	57·93	2·28
All causes	101·07	11·80	4·04	2·33	2·87	3·10	4·32	6·93	10·17	21·99	54·46	147·43	11·02
Deaths ...	302	205	84	62	87	93	159	216	289	423	446	341	2,707
Census population (× 3) ...	2,988	13,845	20,844	26,583	30,219	27,297	36,837	31.122	28,428	16,935	8,190	2,313	245,601

TABLE IX.—1909-1912. FEMALES—FOUR-APARTMENT HOUSES AND UPWARDS. DEATH-RATES PER 1,000 FROM SEVERAL CAUSES AT VARIOUS AGE PERIODS.

Cause of death	AGE												
	—1	—5	—10	—15	—20	—25	—35	—45	—55	—65	—75	75+	All ages
(1) Smallpox	—	—	—	—	—	—	—	—	—	—	—	—	—
(2) Diphtheria and membranous croup .	—	1·13	0·60	0·29	—	—	—	—	—	—	—	—	0·08
(3) Enteric fever	—	—	0·10	—	0·04	0·03	0·05	0·07	—	0·06	—	0·29	0·04
(4) Typhus fever	—	—	—	—	—	—	—	—	—	—	—	—	—
(5) Scarlet fever	—	0·32	0·10	0·15	—	0·03	—	0·03	—	—	—	—	0·03
(6) Cerebro-spinal fever	—	—	—	—	—	—	—	0·03	—	—	—	—	0·00
(7) Measles	0·73	1·62	0·40	—	—	—	—	—	—	—	—	—	0·07
(8) Whooping cough	2·19	0·49	—	—	—	—	—	—	—	—	—	—	0·03
(9) Diarrhœa and enteritis	7·29	0·49	—	0·07	—	0·03	—	0·03	—	0·06	0·59	1·75	0·13
(10) Other digestive diseases	3·65	0·16	0·40	0·07	0·12	0·23	0·16	0·40	0·29	0·77	1·67	5·24	0·44
(11) Puerperal fever	—	—	—	—	0·04	0·03	0·02	0·10	—	—	—	—	0·03
(12) Erysipelas	—	—	—	—	—	—	—	0·03	0·04	0·22	—	0·29	0·03
(13) Other septic diseases	—	—	0·20	—	—	0·03	—	0·03	—	0·06	—	0·29	0·03
(14) Phthisis (pulmonary)	—	—	0·30	0·07	0·48	0·49	0·66	0·80	0·51	0·39	0·10	0·29	0·49
(15) Tuberculous meningitis	3·65	1·13	—	—	0·04	—	0·02	0·07	0·04	—	—	—	0·08
(16) Abdominal tuberculosis	1·46	—	—	0·07	0·08	—	0·05	0·10	—	—	0·10	—	0·05
(17) Other tuberculous diseases	—	0·32	—	—	0·08	0·10	0·05	0·07	0·11	0·06	—	—	0·07
(18) Cancer (malignant disease)	—	—	—	—	—	0·03	0·18	0·66	1·76	3·58	6·49	10·48	1·11
(19) Rheumatic fever	—	—	—	—	—	—	—	0·07	—	—	—	—	0·01
(20) Meningitis (not tuberculous)	2·19	0·65	0·10	0·07	—	—	0·02	—	—	—	—	—	0·05
(21) Cerebral hæmorrhage	—	—	—	—	—	—	—	0·13	0·55	1·99	4·33	10·48	0·61
(22) Other diseases of nervous system ...	3·65	0·16	—	0·15	—	0·10	0·05	0·13	0·40	1·27	2·85	6·11	0·46
(23) Circulatory diseases	1·46	—	0·20	0·22	0·28	0·37	0·52	0·70	0·99	3·36	8·55	21·83	1·45
(24) Pneumonia	4·38	0·97	0·20	0·07	—	0·03	0·13	0·16	0·70	1·38	1·87	6·11	0·50
(25) Bronchitis	4·38	0·49	—	—	—	—	—	0·03	0·37	0·77	3·14	14·85	0·53
(26) Other respiratory diseases	1·46	—	—	—	—	—	0·07	0·07	0·29	0·28	0·88	3·49	0·19
(27) Croup	0·73	—	—	—	—	—	—	—	—	—	—	—	0·00
(28) Influenza	—	0·16	—	—	—	—	—	0·07	0·18	0·06	0·69	0·58	0·08
(29) Violence	—	—	0·10	0·07	0·08	0·03	0·13	0·03	0·04	0·22	0·59	2·62	0·15
(30) Premature births	20·41	—	—	—	—	—	—	—	—	—	—	—	0·13
(31) Unknown	0·73	0·16	—	—	0·04	—	—	—	0·04	—	—	—	0·02
(32) All others	11·59	1·62	0·40	0·15	0·36	0·33	0·47	1·09	1·72	3·36	8·16	60·54	2·30
All causes	72·95	9·87	3·10	1·45	1·64	1·86	2·58	4·90	8·03	17·89	40·01	145·26	9·19
Deaths	100	61	31	20	41	57	114	148	219	324	407	499	2,021
Census population (× 3) ...	1,371	6,183	10,014	13,683	24,780	30,444	14,244	30,177	27,279	18,114	10,173	3,435	219,927

TABLE X.—1909-1912. FEMALES—INSTITUTIONS AND HARBOUR. DEATH-RATES PER 1,000 FROM SEVERAL CAUSES AT VARIOUS AGE PERIODS.

Cause of death	Age												
	—1	—5	—10	—15	—20	—25	—35	—45	—55	—65	—75	75 +	All ages
(1) Smallpox	—	—	—	—	—	—	—	—	—	—	—	—	—
(2) Diphtheria and membranous croup ..	—	0·83	—	—	—	—	—	—	—	—	—	—	0·04
(3) Enteric fever	—	—	—	—	0·54	—	0 67	0·44	—	—	—	—	0·22
(4) Typhus fever	—	—	—	—	—	—	—	—	—	—	—	—	—
(5) Scarlet fever ..	—	3·33	0·60	—	—	0·59	—	—	—	—	—	—	0·30
(6) Cerebro-spinal fever ...	—	—	0·60	—	—	—	—	—	—	—	—	—	0·04
(7) Measles	—	11·67	—	—	—	—	—	—	—	—	—	—	0·61
(8) Whooping cough	—	0·83	—	—	—	—	—	—	—	—	—	—	0·04
(9) Diarrhœa and enteritis .	104·42	9·17	—	—	—	—	0·22	0·44	—	—	—	2·15	1·77
(10) Other digestive diseases .	12·05	0·83	—	—	0·54	0·30	0·22	0·87	1·05	0·58	3·01	1·08	0·78
(11) Puerperal fever ..	—	—	—	—	—	0·30	—	—	—	—	—	—	0 04
(12) Erysipelas	—	—	—	—	—	—	—	—	—	—	—	—	—
(13) Other septic diseases ...	—	—	—	—	—	—	—	0·44	1·05	1·15	—	—	0·22
(14) Phthisis (pulmonary)	—	—	1·19	1·12	5·95	5·05	5·14	17 90	10·55	10·40	7·84	—	6·36
(15) Tuberculous meningitis ...	24·09	1·67	—	0·56	—	—	0·22	0·44	—	—	—	—	0·48
(16) Abdominal tuberculosis	—	0·83	1·19	—	—	—	—	—	—	—	—	—	0·13
(17) Other tuberculous diseases ..	24·09	10 83	3·58	1·67	1·08	—	0·45	—	—	—	—	—	1·38
(18) Cancer (malignant disease)	—	—	—	—	—	—	0·45	2·62	3·69	6·93	10·25	8·60	2·25
(19) Rheumatic fever	—	—	—	—	—	—	—	—	—	—	—	—	—
(20) Meningitis (not tuberculous)	—	—	—	—	—	—	—	—	—	—	—	—	—
(21) Cerebral hæmorrhage	—	—	—	—	—	—	0·22	0·87	2·11	10·98	21·70	17·20	3·37
(22) Other diseases of nervous system ..	4·02	—	—	—	—	—	0·45	0·87	3·16	2·89	3·62	5·38	1·17
(23) Circulatory diseases	4·02	—	—	0·56	2·16	—	0·67	2·62	10·55	20 80	53·65	93·55	10·69
(24) Pneumonia	8·03	—	—	1·67	—	0·59	0·45	1 31	1·58	5·20	9·64	5·38	1·95
(25) Bronchitis	16·06	8·33	—	—	—	—	0·22	0·44	5·27	6·93	19·89	24·73	4·07
(26) Other respiratory diseases ...	—	—	—	—	—	—	—	0·44	—	1·15	1·81	1·08	0·30
(27) Croup	4·02	—	—	—	—	—	—	—	—	—	—	—	0·04
(28) Influenza	—	—	—	—	—	—	—	—	—	0·58	—	—	0·04
(29) Violence	—	—	0·60	—	—	0·30	—	0·44	1·05	1·73	1·20	3·22	0·56
(30) Premature births	68·27	—	—	—	—	—	—	—	—	—	—	—	0·74
(31) Unknown	8·03	—	—	—	—	—	—	0·44	—	0 58	1·20	—	0·26
(32) All others	88·35	3·33	1·79	2·79	2·16	0·59	0·67	1·75	8·45	12 71	25·92	51·61	7·62
All causes	365·45	51·65	9·55	8·37	12·43	7·72	10·05	32·33	48·51	82 61	159·73	218·98	45·47
Deaths	91	62	16	15	23	26	45	74	92	143	265	199	1,051
Census population (× 3) ..	249	1,200	1,674	1,791	1,848	3,366	4,479	2,289	1,896	1,731	1,659	930	23,112
City (all females) .	**131·26**	**26·77**	**5·10**	**2·95**	**3·44**	**4·25**	**5·57**	**9·20**	**15·31**	**29·77**	**60 68**	**133·51**	**15·61**
Deaths	3,628	2,797	624	340	399	508	1,172	1,442	1 742	2,091	2,463	1,675	18,882
Census population (× 3) ...	27,639	104,502	122,283	115,302	115,980	119,592	210,333	156,720	113,841	70,218	10,590	12,546	1,209,576

TABLE XI.—GLASGOW: TOTAL DEATHS, OCTOBER, 1909, TO SEPTEMBER, 1912.

Houses	Males	Females	Total
1 apartment	3,969	4,192	8,161
2 apartments	9,376	8,911	18,287
3 ,,	2,808	2,707	5,515
4 ,, and upwards	2,098	2,021	4,119
Institutions and harbour	1,891	1,051	2,942
Total	**20,142**	**18,882**	**39,024**

physical handicap, which I have endeavoured to illustrate by the difference in the rate of prematurity in the various types of houses. These differences are, I think, to some extent related to the food supply. I have suggested that the handicap is not extinguished by the high rate from prematurity, but may be traced in the disorders of digestion associated with low innervation and in the diseases of early life associated with an unstable nervous system. In later life the influences of the birth surroundings do not, I suppose, wholly disappear, but they are obscured by those which operate on adult life, and, as we have seen, diseases of the nervous system tend to become degenerative in type and appear more frequently among the occupants of houses of larger size.

In this review of the tables I cannot claim to have exhausted the suggestions which they contain. The varying incidence of fatal phthisis for example in the different classes of house suggests a wave of prevalence which has two crests, not always synchronizing as to age-periods, but with a tendency toward postponement of the earlier one as the external surroundings improve. They have associated themselves in my mind with the difference in age-incidence which might be assumed to arise in the earlier ages from an inherited bias and in the later ages from external conditions producing anew a susceptibility to the disease.

In any case the analysis may serve to emphasize the need for carrying inquiry beyond the falling death-rate at all ages to a discrimination of the age-periods at which it principally occurs. It may incidentally also serve to suggest that the whole economic condition of the poor among our population, and not their housing only, is a subject of national importance.

DISCUSSION.

The PRESIDENT (Dr. W. H. Hamer) said the subject dealt with in the paper was an exceedingly interesting one; indeed, if any evidence of this were required, it was to be found in the extraordinary changes in attitude of mind towards it which had prevailed at various times. Nearly two thousand years ago an eminent biometrician, the poet Horace, had said, "Pallida mors. . . . ."—the passage was familiar and he need not quote it, but might paraphrase it thus—the death-rate in one-apartment houses is very much the same as that in houses of four apartments and upwards. That view prevailed for years. Then came the Registrar-General, and people began to believe that the kind of house in which one lived really had some influence on one's health. During the last few years, however, students of the subject had been hearing a great deal of criticism of the view last mentioned. Some of the members of that Section had recently been attending a course of lectures at University College, and there they had been urged to believe that environment had no influence whatever, and that the only thing which could be done to make life worth living was to try to improve the health and the habits of our parents. Then at length came Dr. Chalmers, and brought them down to earth again; it was delightful to find after all that the views upon which they had all been brought up really had something in them. As Sir Shirley Murphy had dealt with this subject in his Presidential Address at York, he hoped he would be prepared to initiate the discussion.

Sir SHIRLEY MURPHY said that it was only by a careful analysis of the causes of death that one could hope to arrive at any final explanation of the differences in the death-rates of various populations in different social conditions. He discussed the subject in his address at York, and he thought that the difference in death-rate was probably one of social condition, and that it was a matter of less power of resistance to disease in the case of the poor as compared with the better-to-do. When he read his paper he did not know of Dr. Snow's paper, and as Dr. Snow was present he hoped he would give the meeting his side of the story, because his work had been very thorough, and his views would be attentively listened to. If the whole question were one of resistance to disease, it might be manifested in disease of various sorts; and Dr. Chalmers had found that in regard to each of the groups of diseases which he had taken, except cancer, the tendency to disease mortality did follow the social condition. He was particularly struck by Dr. Chalmers's method of classification of deaths by ages. The reports of the Medical Officer to the London County Council—he took Dr. Hamer's figures—showed that the differential mortality of populations in different social condition was less manifest immediately after birth—i.e., in populations where there was a large proportion of the poor one did not find that the infant mortality under one week differed so widely in the poor from that which obtained among the more fortunately placed as it did in subsequent weeks of life, and with each increment of age the difference became more pronounced. He did not know whether the question of food could be held to enter widely into that, because the presumption was that certainly in the first two or three weeks of life the baby was at the mother's breast; and unless it could be assumed that the milk of the poor mothers provided for the child less nutriment than that of the rich, he would still be disposed to say that the question was largely one of resistance to disease. He hoped the meeting would be favoured with the views of Dr. Snow.

Dr. E. C. SNOW did not consider his work deserved the kind things which had been said of it, but he would remind the meeting of the chief points of the papers referred to. It was a matter of some controversy, and possibly Mr. Major Greenwood would say something on the other side. The subject of his inquiry was the Darwinian question of natural selection, and he attacked it in the following manner. If one took, say, thirty or fifty distinct populations of babies born in the same year, and followed them through life for five years or ten years, some of them would be found to have a heavy mortality in their first two or three years, other populations a light one. If they were all placed in similar environment, would those baby populations which suffered from a heavy mortality in the first two or three years of life show a light mortality in the later of the series of years? He could not discuss the statistical difficulties of the problem, but he found there was a distinct negative correlation between the mortality in the first two or three years of life and the mortality in the later years. The negative correlation was not large for English districts, but was considerable for Prussian districts. On the average those cohorts of Prussian babies which had one hundred deaths in excess in the first three years, had eighty or ninety deaths in defect in the next seven years. From the evidence he brought forward he drew the conclusion that a considerable proportion of the mortality in infancy was selective, and that those districts with a heavy infantile mortality suffer in later years to a smaller extent than they would if the infantile mortality were lower, and vice versa. The death-rate tables in the present paper he regarded as highly interesting. The first question which it occurred to him to ask when he noticed the different mortalities of the male adult occupants of one-, two-, and three-apartment houses, was with regard to the occupations of these adults. Were the occupations of the inhabitants of the one-, two-, and three-apartment tenements sensibly the same? Was the increased death-rate evidenced in the smaller tenements solely due to the kind of house, or was it merely *associated* with the kind of house, but produced by other causes, such as occupation and habits? He thought the latter to be quite possible. The paper was so thorough in other respects that he felt sorry that the information about occupation was not given. It would be seen that at ages 20 to 25, and 25 to 35, the male death-rate in one-apartment tenements was less than the corresponding one in the two-apartments. But the reverse was the case with females. He did not know whether these differences were significant, but they suggested a difficulty in that the males at those periods of their lives might have gone to institutions to die rather than dying in their own homes. Having being concerned with mortality statistics in connexion with Friendly Societies, he found that though occupation seemed to influence mortality to a less extent than it influenced sickness, the differences produced by occupation were considerable, and he hoped there would be more information forthcoming as to the occupations of the people dealt with in Dr. Chalmers's tables. He would also repeat that though differences in mortality might appear to be *associated* with particular types of tenement it was inadvisable, without further evidence, to assume that the latter was the *cause* of the former.

Dr. DUDFIELD regretted that so short a time had been available for the study of Dr. Chalmers's paper before the meeting, the more so as he (the speaker) had some work in hand on somewhat similar lines. In considering the mortality in apartment houses (*anglice*, tenements) it had to be borne in mind that among the working-classes a man when he married usually began with a home of one or two rooms, and remained there as long as his wages remained comparatively low, or until the sanitary authority required him to move to a larger tenement on account of overcrowding. By that time the children had passed through the most hazardous ages and the more weakly had been weeded out. Usually there followed more prosperous times for the family when the children began to work and added their contributions to the family budget; to be followed, in later years, as the children left the family, by a period of financial depression when the parents returned once again to the smaller tenement. It was evident, therefore, that the problem of tenement mortality was one of great complexity and, for himself, he could not at present see how the problem was to be solved. Dr. Chalmers had given them the numbers of institutional deaths and certain rates based thereon, but, so far as he (the speaker) could gather, had not attempted to allocate the institutional deaths in the manner usual in England. He should like to know whether such allocation was impossible for any reason in Scotland, because the mortality-rates in each class of tenement might be expected to be materially altered if the institutional deaths were properly allocated. He could wish that there were in England similar facilities for studying tenement mortality as there appeared to be in Scotland. If he desired to get out rates such as those presented by the author, it would be necessary to visit every family and house in which a death occurred. He entertained some hope of being able to study the matter in a somewhat similar, but not so exact, manner by comparing the mortality in individual streets, the general characters of which, *qua* housing, were known.

Dr. BASHFORD said that the point in which he was specially interested was the comparison the author brought out between the incidence of cancer in one, two, three, and four-roomed houses, and the incidence of malignant disease generally. As members of the Section knew, that subject had been brought out fully by Sir Shirley Murphy in his reports for 1906 and onwards, and these figures had been confirmed by those for Stuttgart by Weinberg, Berlin by Hirschberg and Silbergleit, Vienna, by Rosenfeld. No relationship had been established between the incidence of cancer and the degree of congestion of living apartments. There was in this respect a marked contrast between cancer and tuberculosis. One would hardly expect to find in populations inhabiting small houses a large amount of cancer, seeing that this was a disease affecting largely the higher age-groups, and one, two, and three-roomed houses contained a high proportion of children. Furthermore, although persons inhabiting such houses often took in aged dependents, the latter, in case of severe illness, almost always drifted into institutions, and therefore the allocation of deaths demanded as great attention as did the age and sex distribution. He noticed that Dr. Chalmers said in his paper that there was no definite relation to be established between the number of rooms inhabited and the incidence of cancer. But on looking at the tables, if one took No. 31, "unknown causes of death," and No. 32, "all other causes of death," or the deaths grouped together as in No. 10—namely, "digestive diseases"—one found also, as the number of rooms increased, a diminishing proportion of cases was allocated to these different diseases. That might also have some bearing on the interpretation of the figures implying merely improving degrees of certification of causes of death. Considering that in the past all cases of cancer were lumped together, as if it were one disease, which it was known now not to be, but to present many varieties, one could understand the generalizations which were made. If statistics of cancer were to continue to advance our knowledge not only must the age and sex distribution be taken account of as in the past, but also the primary sites stated. Dr. Ogle had attempted to tabulate cancer according to the certain selected sites affected, but gave it up as he did not think the expense and labour justified, being unable to see much good result. At a later date the subject was taken up in different ways, and he (Dr. Bashford) had urged its importance as the result of comparative studies on animals and the age-incidence of cancer on organs as distinct from individuals. Sir Shirley Murphy, in taking up the question of density of population for London, had attempted to tabulate carcinoma as distinct from sarcoma. That was arbitrary, as no difference clinically existed, so far as certificates of death were concerned. But, with the backing of the Imperial Cancer Research Fund, the Registrar General's Office had been invited to publish detailed information as to primary sites, which was available for ten years, and the result had been to show that, as had been long recognized, the age and sex were of great importance; but the figures established a new fact, that while the influence of age was similar or identical for the same organs in the two sexes it differed widely from one organ to another. In the tables which Dr. Stevenson published one had the maxima for different organs at certain age-periods; for some sites there was one maximum immediately after birth, and another towards the end of life. For some organs there was only one maximum attained; probably towards the end of natural life. In other sites, the incidence went on increasing progressively, or there might be the suggestion of two waves. The progressive increase, or the apparent drop, might or might not be right; nevertheless, the differences brought out were real differences for all sites, owing to the imperfect certification of cause of death in the aged. It was known that deaths recorded as from old age, 0·65 in 1909 per 1,000, were equal in number to the deaths recorded from cancer in that year. Thus there was a large margin of error, and many deaths set down to old-age were almost certainly due to cancer. Therefore there did not seem much scope for statistical investigation in regard to the incidence of cancer in different houses. But an important point was that which had been raised as to occupations and the allocation of deaths in institutions. Dr. Chalmers gave the deaths per 1,000 from several causes at various age-periods; he presumed that was deaths per 1,000 persons living at those ages, and the other deaths per 1,000 at various institutions. There was, then, no attempt to compare selected populations in these institutions with the general population.

Dr. CHALMERS interposed to explain that his institutional deaths were not the Registrar General's. In Glasgow they returned to the house address, when there was one, every death occurring in an institution. But there were 23,000 people who lived either in Poor Law institutions or in common lodging-houses, or in homes for old people, &c., &c.; they were persons who had no address other than that of the institution in which they lived. The number of deaths of these persons was 3,939 in the period under review.

Dr. BASHFORD, continuing, said his other point was that statistical effort might usefully be diverted to some other aspect of this subject, because of the large amount of experimental work which had been done; the problem was not only a statistical but also an experimental one. For twelve years a large number of experiments had been performed, with the view to ascertaining whether there existed anything in the nature of cancer houses or a population specially invaded with cancer. Part of that investigation consisted of breeding experiments, partly of housing healthy animals along with animals in which the disease had been inoculated. Hundreds of thousands of experiments had been performed on the housing side, but they had never seen a higher spontaneous development of the disease among such animals in comparison with that in animals isolated from the inoculated ones. They had been able to breed a strain of mice in which, at every age-period, the disease was much more frequent than in other strains—at some age-periods almost twice as frequent. And they had housed old animals with young animals for long periods, yet neither in old nor young had any higher incidence been observed, not even in the offspring of mothers already cancerous. The statistics of Sir Shirley Murphy on the matter, because of the allocation of deaths occurring in institutions, were the most reliable which had been published, and the experiments bore out the results of Sir Shirley's statistics in regard to cancer.

Dr. FREMANTLE said he yielded to none in his admiration of the very laborious and interesting compilations which had been set forth in the paper. The discussion had given promise of further work to be done, and he suggested that in regard to these housing questions care should be taken to see that efforts were usefully employed. Whether one was inquiring into the influence of the size of the house, or of the back-to-back house, or problems of sanitation, one could not resist the fact that the problem was a complex one, the causes were multiple, and gross conclusions could not be formed as to one factor alone. In this case the issue, as regards healthiness of the house, was confused by differences of overcrowding, of comparative ages, and of comparative wealth, a matter which must have occurred to the minds of many. This latter was a most important matter in any investigation of the kind; and the average rate of wages must be taken into account. Generalizations based upon other data were likely to be love's labour lost. It was because he so highly looked forward to Dr. Chalmers's future labours in connexion with housing that he insisted on this point. An instance in illustration was raised by Dr. Bashford when he spoke of the incidence of malignant disease. Dr. Chalmers gave that as an exception to his rule; but might it not be—seeing that Dr. Bashford had shown that many differences in cancer-rates might be due to differences in diagnosis—that those who lived in four-room tenements were better attended medically than were those who lived in one room? A careful consideration and tabulation was necessary of all the conditions, including that of wealth, before the comparison of housing conditions could be advanced by comparison of death-rates.

Dr. FARRAR pointed out that in many districts, such as those of the mining and cotton industries, where the average wage was good, the general and infantile death-rates compared unfavourably with those where less money was earned. And it was notorious that during the cotton famine the infantile death-rate was much reduced in the districts affected. Therefore the relationship of dietary and wages to death-rate was not quite obvious.

Mr. MAJOR GREENWOOD said he had not seen the paper until that evening, and it was scarcely fair to criticize after a few minutes' acquaintance a paper which had obviously involved many months' labour. With regard to the controversy as to environment versus selection, he submitted that much of the dispute simply arose from the natural desire of human beings to quarrel with each other. In this paper differences between the rates of mortality in different classes of house were shown. The man in the street tended to jump to the conclusion that the differences in housing was the cause of the difference in mortality, that the obvious explanation was the true explanation. The obvious explanation need not be the true explanation; but still, because an explanation was obvious, it need not be false. He (Mr. Greenwood) thought that there was in some quarters a tendency to assume that when a difference could be plausibly referred to inherited characteristics it needed no further analysis, but that only when the apparent explanation was environmental further analysis was necessary. Professor Pearson had shown that the differences in the infantile mortality rates of families of bad habits or health when compared with persons of good habits or health, irrespective of housing conditions, were greater than the general differences between the rates for all families in "through" and all families in "back-to-back" houses, but a difficulty he (Mr. Greenwood) felt was as to whether the people with bad habits went to the back-to-back houses because they had bad habits, or as to how far living in back-to-back houses produced bad habits. He did not think that question had been satisfactorily answered. But with regard to testing how far any effect was environmental and how far it was selective, he could see no other process than that of Dr. Snow; and Dr. Snow was mistaken in supposing he differed from his view. Such difference as there might be between himself and Dr. Snow was as to whether one could neutralize the environmental factor by operations performed on mortality figures alone. He agreed with Dr. Snow that one could not judge as to whether the influence of environment was important simply by showing that one got the same difference between the rate of mortality in the infants in the different classes of house as in the case of children aged 1 to 5, because there one was comparing contemporaneous populations. It was clearly necessary to do as Dr. Snow suggested—namely, to take a certain number of children living under certain conditions, of all ages, and then to follow the survivors after infantile age through life, and to compare their mortality from age to age with that of a similar set under other conditions. That seemed a very difficult investigation to carry out, owing to the migration continually going on from one stratum to another. Owing to the imperfections of the statistics, more attention should perhaps be paid to the positive than to the negative results, but here difficulties might arise. In Dr. Snow's valuable paper, for instance, it might be difficult for a reader to be clear why one should pay more attention to a set of data which gave a high negative correlation, than to another set which gave a low one; and the suspicion arose in the mind that it was very easy in these complicated statistics to convince oneself that the statistics which yielded the result which accorded with one's a priori ideas were the more accurate ones. He did not suggest for a moment that that was the case in Dr. Snow's paper, for Dr. Snow gave reasons which could be weighed for his preference; but it was necessary for other people to be on their guard against falling into such a trap. Dr. Bashford had alluded to the question of cancer, and the great fallacies which arose owing to errors and ambiguities in the statistics. Mr. Maynard had recently published an interesting paper which exhibited a high correlation between the death-rate from diabetes and the death-rate from cancer in American cities. Mr. Maynard gave some general reasons, which were not perhaps very definite, for thinking there should be a correlation between these different diseases. He (Mr. Greenwood) found that if one applied the same process to other countries, sometimes one got the same results as Mr. Maynard, and sometimes different results; and one was conscious of a tendency to suppose, if one agreed with Mr. Maynard's general views, that where the statistical results which supported it were obtained the cancer statistics were better than they were in other countries which gave negative results. In all these investigations it was best to adopt the President's attitude of resolute scepticism.

The PRESIDENT remarked that Dr. Dudfield had made the point as to the allocation of deaths in institutions to the different classes of houses. Dr. Chalmers had spoken of the ebb and flow of the population as between one class of population and any other. Taking the city as a whole, Dr. Chalmers had informed him that there was a loss of 80,000 persons during the last ten years. No one knew how many deaths had occurred among those 80,000, but if in addition to the other allocations mentioned by Dr. Dudfield, it had been possible to allocate to the several class groups the deaths among the 80,000, still further differences would have resulted, and possibly some of those anomalies which had been referred to as occurring at the higher age-periods would thus have been accounted for. In looking through the returns of London deaths, and comparing the later years mentioned by Dr. Chalmers with the earlier year 1901, it transpired that the higher number in the earlier periods compared with the later were, first, in diarrhœa—and that, no doubt, followed from the fact that in the three later years there were exceptionally wet summers—and then, further, the other excessive numbers found were in phthisis, bronchitis, and diseases of the nervous and digestive systems. Under all those headings (with the exception of diarrhœa) deaths at older ages were higher than those at younger ages. If, then, some of the deaths among the 80,000 persons leaving Glasgow could have been referred back to the different groups of houses, they might have tended to raise those death-rates at the later periods in the one-apartment and two-apartment houses which Dr. Chalmers had told them were lower than might perhaps have been expected.

Dr. CHALMERS, in reply, said it had been pointed out to him, in a friendly way, that he had not published his conclusions until after the meeting. He had enjoyed the criticisms, which had to some extent suggested new lines of inquiry. He had used the house-grouping because it seemed to him to represent in a rough way the economic grouping; house rentals or even income-tax returns might also have been used for a similar purpose. What he wanted to present was the relationship of two things which had a common association in the house—viz., the occupants and the deaths occurring among them. That was one reason why he had tried to place the death-rates according to house groupings. He had hoped to get comparative tables of occupation and income, but one of the difficulties was the selection of proper samples. He had taken the occupations of 3,400 families selected from seventeen of the industrial wards; but owing to lack of time it was impossible to bring the analysis beyond the twenty-three primary groups of the Registrar-General's classification. At some future time he might be able to bring the facts of the average incomes associated with the occupations followed by the inhabitants of the different sizes of house into line with the death-rates. That had not been overlooked, but it could not be accomplished in time. He had begun the inquiry with the view of ascertaining the changes in the death-rates of particular social groupings between 1901 and 1911. The death-rate was not that of the decennium, but the death-rate around census periods. The personnel was continually changing, people were frequently moving from one part of the city to another, and he thought also from one size of house to another. It would be a difficult matter to follow the life-history of each family in any considerable number of cases in such a way as to trace a continuous life record. What seemed to him to require investigation was the change in the social incidence of particular types of disease as age advanced. Dr. Bashford disagreed with his remarks about cancer because he found a similar disparity in looking over the figures for indigestion and for diseases of the nervous system. He (the speaker), following up the suggestion of low vitality at birth in the children of the smaller-sized houses, as shown in the death-rate from "prematurity," was inclined to regard the change in the house-incidence of these two groups of disease, associated as it was in after years with a change in type among the diseases of the nervous system from convulsive to degenerative forms, as evidence that the birth-handicap continued during adolescence at least. It seemed to be extinguished thereafter, or to become obscured by the influences affecting adult life. He had read Dr. Snow's paper, and agreed to some extent in thinking that in certain conditions diseases were selective. That, indeed, was the purpose of his own suggestions in the illustrations he used regarding prematurity and diseases of digestion and of the nervous system. He believed they might be regarded as selective diseases although that might only carry them one stage further back to the inadequate food supply of the mother. There was no evidence that the infectious diseases were selective in this sense. Sir Shirley Murphy made an interesting statement with regard to deaths in the early weeks of life, as being similar in rate for small and larger houses. Two or three years ago, when making another inquiry, what struck him was that if one took the deaths from immaturity, one found that the rate in the different wards of the city differed enormously, but that there was a constant ratio between their volume and the final death-rate under one in the same ward. The ultimate death-rates differed, as the original prematurity rates did, but their relation to "immaturity" appeared to be uniform. With regard to the difficulty as to institutional deaths, mentioned by Dr. Dudfield, that was being got over in Scotland. For years, however, in Glasgow the practice had been to refer back each institutional death to its own house and district; and the deaths of 1911 were quite comparable with those of 1901. He did not think Dr. Farrar's illustration from the cotton famine was on all fours with his own suggestion regarding prematurity; because in the cotton famine it was the difference between children who were nursed and children who were not nursed because their mothers were in employment.

Section of Epidemiology and State Medicine.

April 25, 1913.

Dr. W. H. Hamer, President of the Section, in the Chair.

A Note on Sleeping Sickness in Principe Island and Angola, West Coast of Africa.

By Surgeon McCowen, R.N., M.D.

(Contributed by Fleet-Surgeon P. W. Bassett-Smith, C.B., R.N.)

H.M.S. "Dwarf" visited Principe Island on October 28, 1911, where we remained a couple of days. The island lies 120 miles north-westward from Cape St. John, the nearest part of the coast of Africa, and 116 miles south-westward of Fernando Po island. It is in its physical features and aspect one of the most remarkable islands in the world. It is 9 miles in length, north and south, with an average breadth of 4 miles; it is in possession of the Portuguese, by whom it was discovered in 1471.

Nearly the whole of the population reside in the town of San Antonio, situated at the head of a bay on the east side of the island. In 1900 the population numbered about 4,327, and consists mostly of natives.

As regards climate, the island is subject to much rain, and the soil is exceedingly prolific; the luxuriant vegetation, which everywhere abounds, becomes rank to such a degree as to cause the island to be unhealthy. The climate is hot and humid.

Sleeping sickness abounds in Principe, and there have been as many as ten deaths in one day from this cause, and never less than two. According to the medical officer, Dr. Alfredo Salvador, more than half the mortality is caused by sleeping sickness.

I was fortunate enough to procure a collection of tsetse-flies at Principe. After obtaining the flies at Principe, I lent them to Dr. Carrio Mendes, at St. Paul de Loanda in Angola. Dr. Mendes has written a book in French on the tsetse-fly, and he was good enough to go over my collection. He found them all to be of the *Glossina palpalis* species, which, he said, were the only ones found in Principe, as he had visited that place himself some few years ago. To this collection he kindly added two more—one a variety of palpalis called *Glossina Wellmani*, after an American doctor who discovered it, and another the *Glossina longipalpis*. These three, the *Glossina palpalis*, *Glossina Wellmani*, and *Glossina longipalpis*, are the only three species of tsetse-flies to be found in Angola.

Both in Principe and Angola I saw about thirty-five cases of trypanosomiasis in all stages of advancement, some with adenitis only, some with papular eruptions and œdemas; others in the final stages of implication of the nervous system, such as languor, fibrillary twitchings of the tongue and hands, and others in the last comatose stage.

As regards the trypanosome, it is first sought for in the blood, and if not found here, in the lymphatic glands or cerebro-spinal fluid. In the last-named place this generally corresponds with the nervous symptoms. Once the nervous symptoms make their appearance, the case is a hopeless one. Besides in such animals as rats, there is no other means yet known of cultivating the *Trypanosoma gambiense* artificially. The metamorphosis of the trypanosome is not yet known, but Dr. Mendes says it must be in the glossina at least fifteen days before it can transmit sleeping sickness. It has been proved beyond doubt that the *Glossina palpalis* transmits the trypanosome to human beings, and the abundance of *Glossina palpalis* at Principe accounts for the great prevalence of that disease there. It is now believed that other varieties of the tsetse besides *palpalis* can transmit sleeping sickness. The latest comes from Dr. Kinghorn, now working in Northern Rhodesia, who has succeeded in transmitting sleeping sickness to monkeys by means of the *Glossina morsitans*.

The main symptom to be found in all the cases I saw was the enlargement of the cervical glands, which also became tender. Besides this there were to be found cases with irregular fever, and sometimes erythema with infiltration and œdema in Europeans. During these stages the trypanosome is only to be found in the blood and the glands on puncture of the latter. When the trypanosomes are found in the spinal fluid, or its toxins reach the cord, the final stage of nervous symptoms is then reached, that is, (*a*) languor, (*b*) fibrillary twitchings of the tongue and hands, (*c*) comatose state, which may last from four to eight months—then death.

The cases cured are those in whom the trypanosomes or toxins have not reached the spinal fluid, as at the commencement trypanosomes appear in the blood only.

The mortality at Principe, as before referred to, is very great. At St. Paul de Loanda I saw one post-mortem, at which Dr. Mendes demonstrated an extensive meningo-encephalitis with turbidity of the cerebral fluid.

A wet blood preparation was made of a few cases. It has a peculiar granular appearance on microscopical examination, on account of the agglomeration of the corpuscles into heaps and clusters, the usual rouleaux arrangement being absent. Sir Patrick Manson says, "Such a disposition of corpuscles is very significant of trypanosome infection, whether the parasite be found or not, and sometimes aids in doubtful cases."

The two most important means of early diagnosis are the enlarged glands and gland puncture for the trypanosome. Todd, on his expedition up the Gambia, especially emphasized these two points.

Treatment.—Atoxyl is used both in Principe and Angola, and is given as follows: Double injections of 0·6 gr. every ten days, that is, two injections of 0·6 gr. with an interval of one day, and the same procedure ten days afterward. The results are fair. Dr. Mendes at St. Paul de Loanda has tried "606" and has got some good results, but Dr. Salvador at Principe informs me that he has not had such good results with "606," and that after ten days the trypanosomes reappear in the blood. When at Fernando Po island I saw three cases of trypanosomiasis (Europeans) who were undergoing "606" treatment, and the medical staff said that they had good results. These three cases at Fernando Po came from mail boats, and were contracted in Angola. It is worthy of note that neither Fernando Po island, just north of Principe, nor St. Thomas island, just south of Principe, have sleeping sickness.

Prophylaxis.—This is based on the carriers—i.e., tsetse-flies. These tsetse-flies prefer damp places, especially where the vegetation is dense, and where there are plenty of wild animals, on whose blood they feed; all this being offered at Principe. The tsetse generally does not travel very far, but occasionally follows people to great distances. The intelligent natives of Principe have their houses fitted with insect-proof windows and doors, made of a very finely meshed wire gauze, and do not venture out for pleasure until dusk, when the tsetse is inactive. The telegraph operator, a Sierra Leone native, informed me that he had not ventured out of his house before dusk for six months. The chief place where the tsetse-fly attacks persons is at the back of the neck, and the natives have the useful habit of continually brushing this part of the head with their hands when walking.

Dr. Carrio Mendes was asked by the Portuguese Government to suppress the trypanosomiasis at Principe, but will only undertake to do so on condition that he is given complete control. He thinks that in Principe, if the bush were cut down near the water's edge, it would not be a guarantee of doing away with the sleeping sickness, as the flies may go further inland to the cocoa plantations. His treatment is radical; he thinks the only way is to kill all the animals, and then clear the whole island of natives and Europeans for one year, when the trypanosomiasis will probably die out. Dr. Salvador tried to get the natives to go immediately to hospital when bitten by a tsetse, for atoxyl injection, but the natives show a strong aversion to any treatment, and notwithstanding the efforts of the authorities none present themselves for treatment.

For non-insular places like Angola, the only prophylaxis that can be carried out is that recommended by Todd after his expedition up the Gambia, that is, examination of all natives, and isolation stations for the same. He suggests a special medical staff for this purpose.

Note.—An examination of the collection of tsetse-flies sent by Surgeon McCowen showed that the great majority of the specimens were *Glossina palpalis* and two examples of the variety *Glossina palpalis Wellmani* (Austen). There was also a specimen of *Glossina medicorum* (Austen) in excellent preservation; as this is new to the district, and is a rare species, it should be recorded. Examples of this fly have been found only in Liberia, the Gold Coast, and Southern Nigeria.—P. W. BASSETT-SMITH.

The Diphtheria Bacillus and Scarlatinal Infection.

By T. Shadick Higgins, M.D.

The object of this paper is to record certain facts as to the incidence of the *Bacillus diphtheriæ* in cases of scarlet fever in Birmingham; and, further, to record observations which appear to show a connexion between the presence of this germ and the persistence of scarlatinal infectiousness, with particular reference to the question of return cases. It deals with the association of this bacillus, not with clinical diphtheria, but with scarlet fever.

Attention was directed along these lines by my finding a number of cases of rhinitis associated with the presence of the Loeffler bacillus in the nose amongst those convalescent cases of scarlet fever whose arrival home from the fever hospitals had been followed by the occurrence of return cases of scarlet fever in their households. This raised the question whether the Loeffler infection had any connexion with the occurrence of the return cases of scarlet fever, and it was arranged by Dr. Robertson that I should take swabs from the nose and throat respectively of all cases that showed scarlatinal infectivity subsequently to their discharge from hospital. It was also arranged that all cases of scarlet fever should be similarly swabbed in the city hospitals at the time of their admission to and discharge from hospital.

In February, 1912, I read a paper before the Midland Branch of the Society of Medical Officers of Health [8], in which I gave the results of this investigation up to November, 1911. Since then more work has been done upon the subject, and in venturing to bring the matter before this distinguished Society I have not only recorded this further work, but for the sake of completeness have not hesitated to repeat much of what was then said.

With the exception of the examination of the swabs taken from patients during their stay in hospital, the bacteriological work has been done by Dr. C. J. Lewis in Professor Leith's laboratory at the University of Birmingham. In addition to the routine examination of swabs Dr. Lewis has isolated the diphtheria-like bacilli in more than sixty cultures.

DEFINITIONS.

In order to avoid misunderstanding from the use of certain arbitrary terms, I will here give the definitions of some of the expressions which I am using in this paper.

The term "primary case" is to be understood to mean a case of scarlet fever whose return from a fever hospital has been followed by the occurrence in the same house of a further case or cases of that disease beginning within eight weeks of the date of return.

The term "return case" is used for such secondary cases without the assumption being made that they all, without exception, have been necessarily caused by contact with the corresponding primary cases.

Except where it is specially mentioned to the contrary, no return case has been considered or enumerated where the diagnosis of either the primary or secondary case was revised in hospital to "not scarlet fever."

No swabs have been taken from patients who have caused further cases in their households ("recovery cases") after their release from isolation practised in their own homes.

SCHEME OF WORK.

The work reported in this paper has been devised upon the following plan:—

I. Amongst those cases of scarlet fever which caused return cases on their arrival home from hospital, the percentage which were infected with true *Bacillus diphtheriæ* was determined. The manner in which this was arrived at is given in detail below.

II. For comparison with this result the incidence of the bacillus (expressed as a corresponding percentage) was also determined amongst cases of scarlet fever whose arrival home from hospital was *not* followed by the occurrence of return cases. In addition, the incidence of the bacillus in scarlet fever cases during their stay in hospital was investigated.

III. Lastly, the proportion of normal school children showing the true *Bacillus diphtheriæ* was determined.

For the sake of clearness, I have divided the paper into three sections corresponding to the above three headings, and a fourth section, in which I have made some comments upon the results.

SECTION I.

The bacteriological investigation of patients who had caused return cases was carried on from December 19, 1910, to November 8, 1912, a period of nearly two years (during which time 5,573 cases of scarlet fever were admitted to the city hospitals).[1] The number of return cases which were notified in that time was 485. These occurred in 365 houses, to which 419 primary cases had returned. The difference in these figures is, of course, due to the fact that more than one primary case returned to some houses, and more than one return case occurred in others. A negligible number of these cases ensued upon the return of primary cases from fever hospitals outside the city, the vast majority being connected with cases from the city hospitals.

The primary cases were visited as soon as possible after the occurrence of the return cases, usually one to three days after notification of the return cases, and swabs were taken from the nose and throat respectively. The specimens from the nose were taken by passing the swab as far into each nasal cavity as the rigid rod would pass, and from the throat by rubbing it well on and about the tonsils. When there was otorrhœa a swab was also taken of this discharge.

The swabs were examined by Dr. Lewis, who inoculated tubes of Loeffler's blood-serum in the usual way, and examined the resulting eighteen-hour cultures stained by Neisser's method, and by simple stain (carbol thionin). He reported as "positive" those cultures which presented diphtheroid bacilli showing polar staining with the Neisser stain like Loeffler's bacillus: that is to say, those cultures in which it was not possible to return a negative report as to the presence of *Bacillus diphtheriæ*. In this paper the terms "positive" and "negative" are used in this sense entirely.

I myself took the swabs from all the primary cases (102) before November 8, 1911. After that date I also dealt with the primary cases (88) in the north-west division of the new city, those in the other three divisions (229) being examined and swabbed by Dr. John Dale, Dr. T. W. Beazeley, and Dr. Reginald Green. The results of the swabbing of these cases were as follows:—

---

[1] On November 9, 1911, the population of the city was increased by extension from 526,030 to 842,337, and all return cases have been considered which occurred within the old city before that date or within the extended city on or after it.

	Primary cases
Positive swabs from nose only	112
,, ,, ,, ear only	5
,, ,, ,, nose and ear	4
,, ,, ,, throat only	4
,, ,, ,, nose and throat	19
,, ,, ,, nose, throat and ear	1
Total positive	145
Negative swabs only	234
Swabs not taken	40
Total	419

Thus 145 of the 379 primary cases swabbed were positive, or 38 per cent. (Of the 190 cases which I myself swabbed 42 per cent. were positive; and amongst the 229 swabbed by my colleagues 35 per cent.)

It should be mentioned that only in a few instances were the cases which were reported negative subjected to a second swabbing. Had this been done the number of positives would undoubtedly have been higher. Moreover, in about eighty cases amongst those swabbed the throat swabbing was omitted for various reasons.

As I mentioned above, more than one primary case had recently returned to some of the houses furnishing return cases. As in all probability only one primary case in each of these houses had actually infected the return case, it is more useful to give the results in terms of houses where return cases contracted scarlet fever than in terms of individual primary cases. In houses where there was more than one primary case the house is taken as positive if *any* of the primary cases gave a positive swab, and as negative if *none* of them did so. On this basis the results become:—

Number of houses with positive results	136
,, ,, ,, ,, negative results	189
,, ,, ,, where swabs were not taken	40
Total	365

—that is, one hundred and thirty-six positive out of 325 houses, or 42 per cent.

Besides the cases which were found to be positive when swabbed in this way after causing return cases, there were a number of other primary cases which, though giving a negative result on that occasion, had been found to be positive some time during their stay in hospital: that is to say, the percentage given above (42) is an under-statement of the number of return case houses where a primary case has given positive results at *any* time during or after its stay in hospital. In my former paper I gave results in which every patient who had given a positive swab in hospital or subsequently was treated as positive. On this basis, up to November 8, 1911, out of eighty-five houses where return cases had occurred, positive primary cases had returned to fifty-eight—i.e., 68 per cent.

It must be admitted that the microscopic identification of Neisser-staining bacilli indistinguishable from Loeffler's bacillus is not sufficient evidence in series such as these upon which to give a percentage representing the proportion of cultures containing the *Bacillus diphtheriæ.* Isolation and testing of the Neisser-positive bacillus is a necessary corollary to its discovery in mixed culture, and until this has been done it is not possible definitely to distinguish the *Bacillus diphtheriæ* from diphtheroid bacilli which closely resemble it in being Neisser-positive and in other respects. This has become very clear from Dr. Lewis's work.

Before I published my results up to date in February, 1911, Dr. Lewis had isolated the bacillus which had led to the "positive" report in three of my positive cases, and in each one had obtained a true Loeffler culture which was virulent, killing a guinea-pig within two days of subcutaneous injection, and produced no effect in a similar guinea-pig which had previously been protected by an injection of diphtheria antitoxin. From this I concluded that it was safe to assume that most of the positive cultures contained the true *Bacillus diphtheriæ.*

As doubt was thrown upon the validity of this assumption, Dr. Lewis kindly agreed to isolate a consecutive series of these positive cultures. Dr. Dale and I were then dealing with return cases in the northern half of the enlarged city, and it was arranged that all the positive cultures which we obtained should be tested in this way. Reckoning by the date of notification of the return cases, the series began on April 6, 1912, and ended, with an interruption of two months in the summer vacation, on October 17. For nearly four months almost all the positive cases from half the city were specially investigated in this way.

The number of positive swabs in this series was thirty. (It must be mentioned that of the thirty, three were from primary cases who were afterwards found not to have had scarlet fever, though the return cases had true scarlatina. These have not been cut out of the series.) Of these thirty Dr. Lewis was able to isolate the Neisser-positive bacillus in twenty-two instances. All these twenty-two diphtheroid organisms he tested in pure culture in sugar and by inoculation into guinea-pigs, and divided them into two groups—viz., those which were the true *Bacillus diphtheriæ* of Loeffler, and those which were other diphtheroid bacilli. The Loeffler group were identified by their microscopic appearance, their appearance in broth cultures, and by their producing acid in glucose and dextrin media, but not in saccharose. Thirteen of the twenty-two gave these reactions and were inoculated subcutaneously into guinea-pigs (1 c.c. of forty-eight hours' broth). Eleven of the thirteen were fully virulent, killing the animal within a few days with post-mortem signs typical of death from *Bacillus diphtheriæ*. The bacillus was recovered in pure culture from the local lesion in all these cases. In the other two of the thirteen the guinea-pigs developed a swelling at the site of inoculation and showed signs of ill-health, but did not die. It was concluded that these two were also *Bacillus diphtheriæ*, deficient in pathogenicity. All the thirteen cultures were also inoculated into guinea-pigs which had been protected by the injection of diphtheria antitoxin; in every case they were harmless to such protected animals. The other nine cultures of the twenty-two did not agree with Loeffler's bacillus in culture reactions (and some of them in morphology), and were non-pathogenic to guinea-pigs. They all gave Neisser-positive individuals, which accounted for the appearance in the original mixed cultures that gave rise to the "positive" diagnosis.

Dr. Lewis concluded from these experiments that of the twenty-two "positive" cultures in which the Neisser-positive diphtheroid was isolated at least thirteen contained the true *Bacillus diphtheriæ*—i.e., 60 per cent.

The patients who gave the true *Bacillus diphtheriæ* exhibited the germ at the time of swabbing as follows: In nose only, six cases; in nose and ear, one case; in nose and throat, four cases; in nose, throat and ear, one case; in throat only, one case.

There appears to be no reason why the positive cultures obtained from primary cases during these particular four months should differ as to the proportion containing the *Bacillus diphtheriæ* from those given by such primary cases throughout the rest of the two years over which this investigation extended, especially as all the cultures were examined by the same observer. On this assumption we arrive at the result that about 60 per cent. of 42 per cent. (about 25 per cent.) of all houses where return cases occurred had received home from hospital a primary case from whom the *Bacillus diphtheriæ* could be recovered.

This figure can to some extent be checked in the following manner: During the four months in which the "positive" bacilli from the northern half of the city were being isolated and tested we swabbed the primary cases at forty-six houses, and obtained the true *Bacillus diphtheriæ* from twelve of them. This gives a proportion of 26 per cent. of all return case houses, as compared with 25 per cent. obtained by the other method.

SECTION II.

The striking fact that a quarter of this class of infectious scarlet fever convalescents can be shown to be harbouring the true Loeffler bacillus in their nose or throat subsequently to their discharge from the fever hospital is sufficient demonstration that this germ must be fairly common amongst the scarlet fever patients in the Birmingham fever hospitals. In my former paper I quoted the following extracts from the literature bearing upon the prevalence of this germ in scarlet fever.

In 1898, Todd [14] investigated a form of external rhinitis occurring in scarlatinal convalescents which was characterized by redness at the nostrils, passing on to the formation of raw granular surfaces with crust formation and bleeding, and often associated with spottiness of the face and pustules elsewhere, a condition familiar to all who have had to deal with scarlet fever wards. He found fifty-one (or 14 per cent.) of such cases in 365 cases of scarlet fever at the London Fever Hospital, and on taking nasal swabs obtained the bacillus in every one of the fifty-one cases. Several of these were isolated and proved to be virulent Loeffler bacilli, which could be antagonized by diphtheria antitoxin. He obtained the same organism from the secondary pustules.

Williams (1901) [15] did similar work, and obtained this germ from cases of rhinorrhœa and otorrhœa in scarlet fever. In a series of scarlet fever cases he examined all those which showed any rhinorrhœa, however slight, and in fifty-seven (or 40 per cent.) of 141 cases of rhinorrhœa found the Loeffler bacillus in the discharge. In sixty-eight cases of scarlatinal otorrhœa also he found five (or 8 per cent.) with this bacillus. Only a minority of the cultures tested on guinea-pigs were typically virulent.

It appears, then, well established that rhinitis and otitis in scarlet fever are often characterized by the presence of the *Bacillus diphtheriæ* in the discharge.

In regard to the frequency of its presence in uncomplicated cases of scarlet fever, or in cases in general of this disease, the most striking feature of the results recorded by various observers is the great lack of uniformity that they show.

Garratt and Washbourn (1899) [4] found that amongst 666 cases of scarlet fever admitted to the London Fever Hospital, only eight (or 1·2 per cent.) showed bacilli in the *throat* morphologically resembling the *Bacillus diphtheriæ*. Their virulence was not tested.

W. T. G. Pugh (1902) [10], at the North Eastern Hospital, London, examined the noses and throats of scarlet fever patients on admission. Out of 415 cases uncomplicated by clinical diphtheria seventeen (or 4 per cent.) showed Loeffler bacilli in the throat, and five of these tested on guinea-pigs were all non-virulent. Out of 414 cases uncomplicated by faucial diphtheria or membranous rhinitis, thirty-three (or 8 per cent.) showed the bacilli in the nose, and six of these tested on guinea-pigs were all non-virulent. In wards where post-scarlatinal diphtheria existed he several times found virulent diphtheria bacilli, and also in fibrinous rhinitis occurring during stay in hospital.

Escherich and Schick (1912) [2] state that Sellner found diphtheria bacilli in 2 per cent. of his (103) scarlet fever cases; Soerensen in 16 per cent. of 1,500 cases (of which thirty-two had clinical diphtheria), and Ranke in 53 per cent. of his cases.

The lack of uniformity in the above results makes it appear that the prevalence of this germ in scarlet fever hospitals varies from place to place, and therefore the prevalence of the germ in the Birmingham primary cases should be compared only with the results obtained in the Birmingham hospitals.

During 1911 the scarlet fever patients in the two chief Birmingham fever hospitals, Little Bromwich Hospital and Lodge Road Hospital, were bacteriologically examined on admission and on discharge under the supervision of the Medical Superintendents, Dr. T. W. Beazeley and Dr. H. M. Cargin. At both hospitals the noses and throats of the patients were separately swabbed. The results of this work will be found in my former paper [8]. At Little Bromwich 32·5 per cent. of 1,063 patients were reported positive on admission (24 per cent. in the nose and 14 per cent. in the throat), and 20·7 per cent. (nose only) at the time of discharge. At Lodge Road 23 per cent. of patients were reported positive (nose or throat) on admission, and 49·6 per cent. of all patients at some time or other during their stay in hospital. Unfortunately, these figures were compiled from the results of a number of medical officers working more or less independently, and were not controlled by isolation of the suspicious organisms.

In the above mentioned paper I worked out from the hospital figures certain results which tended to show some connexion between the prevalence of the positive germs and the occurrence of the return cases, but at the same time expressed the view that the evidence was not conclusive. But in view of other evidence which I give below I feel that more definite results might perhaps be obtained if the whole of the bacteriological examinations inside the hospitals and subsequently in the patients' homes were carried out by a single observer, and the results checked by the necessary isolation and testing of the bacilli.

I have since attacked the subject in a different way. Knowing what proportion of patients causing return cases have true *Bacillus diphtheriæ* which can be demonstrated by swabbing I have tried to get corresponding figures for patients who have not caused return cases; my object being to compare the incidence of the true Loeffler bacillus after discharge from hospital in those who remain capable of spreading scarlet fever with the incidence in those who have not shown themselves to be infectious. For this purpose I visited about a hundred cases ten days after their return from the fever hospital, and took swabs from the nose and throat respectively of each. Dr. Lewis examined the resulting cultures, and in all cases where he found bacilli showing polar staining with the Neisser stain and resembling the *Bacillus diphtheriæ* he isolated and investigated these bacilli. This work lasted from July 22 to July 26, 1912, and after the summer vacation from October 15 to December 19, 1912. On most of the weekdays during this time I swabbed a proportion of the cases who had been out of hospital ten days and who had not caused any return case. Altogether the series comprised 107 cases, but five of these subsequently caused return cases and were, of course, excluded. The cases were quite unselected, except that in the latter half of the series no cases were swabbed unless there was at least one child in the house aged under 15 who had not had scarlet fever. The ages of the 102 cases which comprised the series were as follows:—

0-1 year	0 case	8-9 years	7 cases
1-2 years	2 cases	9-10 ,,	4 ,,
2-3 ,,	2 ,,	10-11 ,,	3 ,,
3-4 ,,	8 ,,	11-12 ,,	9 ,,
4-5 ,,	13 ,,	12-13 ,,	2 ,,
5-6 ,,	16 ,,	13-14 ,,	3 ,,
6-7 ,,	12 ,,	14-15 ,,	5 ,,
7-8 ,,	8 ,,	over 15 ,,	8 ,,

In the 102 Dr. Lewis found twenty with Neisser-positive polar staining bacilli. He plated out all these and succeeded in isolating the

Neisser-positive bacillus in all except two cases. In the eighteen cases in which isolation was successful the bacillus in seven instances proved to be the true *Bacillus diphtheriæ*, as determined by morphology and culture reactions (*see* above). All seven proved virulent to unprotected guinea-pigs and produced fatal results, though in two cases death did not take place until the tenth and eleventh day respectively, with necrosis at the site of injection. The bacilli were recovered in pure culture from the local lesions. All the seven were harmless to guinea-pigs previously protected by the injection of diphtheria antitoxin. The other eleven isolated bacilli did not correspond with Loeffler's bacillus in culture reactions, and some also in microscopical appearance. Thus about 7 per cent. of the patients whose return from hospital gave rise to no return cases showed the true *Bacillus diphtheriæ*, contrasting with 25 per cent. of those who did show themselves in this way to be able to infect others with scarlet fever. Even then it is possible that some of the seven were really infectious, but for various reasons, such as immunity to scarlet fever on the part of other members of their households, were unable to cause return cases. Indeed, some of them had nasal conditions which one knows to be frequently associated with the production of return cases.

SECTION III.

When I was in possession of these facts as to the distribution of this germ in scarlet fever, it appeared desirable to compare them with the prevalence of the same germ in the normal population, especially amongst children, who, of course, furnish the bulk of our scarlet fever cases.

The most comprehensive piece of work on these lines appears to be that recorded in the "Report on Diphtheria Bacilli in Well Persons" (1902) [9] of a Committee of the Massachusetts Association of Boards of Health. In this investigation over 4,000 persons were examined, and the results were divided into two groups. In the case of 3,096 persons from communities practically free from diphtheria, 1·4 per cent. showed typical diphtheria bacilli, of which 0·9 per cent. had them in the nose, and 0·6 per cent. in the throat. Fifty-five of these positive cultures were tested and five proved to be virulent. In the case of 1,154 persons, almost entirely children, in institutions where diphtheria had existed from one to eighteen months previously, the figures were higher—viz., 2·9 per cent., of which 2·1 per cent. showed the bacilli in the nose, and 1·5 per cent. in the throat. Thirty-one of these positive cultures were tested and six found to be virulent. The difference between these two sets of cases is attributed by the Committee to the difference in the prevalence of diphtheria in the communities under consideration. This conclusion is obviously of great importance when we are considering the distribution of this bacillus.

That diphtheria bacilli are frequently to be found in healthy persons who have been exposed to the infection of diphtheria is well known. Graham-Smith (1908) [5] points out that the frequency of this occurrence depends largely upon the intimacy of contact, a larger proportion of carriers, for instance, being found in the members of the families of diphtheria patients than in the scholars of diphtheria-infected schools. Seligmann (1911) [11] has noted that in diphtheria-infected institutions the departments with fewer cases tend to contain fewer "carriers" than the departments with greater numbers of cases (he dealt mainly with the throats only). Steenmeyer [12] failed to find diphtheria bacilli in the throats of forty-four children in a Dutch village which had been free from diphtheria for ten years, but in the throats of forty-one children of Utrecht, where diphtheria was endemic, he found diphtheria bacilli in several. Graham-Smith [6] concludes that virulent diphtheria bacilli are very rarely found in the throats and noses of healthy persons who have not been in immediate or remote contact with cases of diphtheria, but that in 2 to 3 per cent. of persons unexposed to infection bacilli are to be found differing from ordinary diphtheria bacilli only in their non-virulence to guinea-pigs.

The fact that the degree of prevalence of diphtheria in a community is reflected in the prevalence of the bacillus in healthy persons must therefore be held to explain the great disparity which appears amongst various published results [3].

For this reason I did not feel justified in making any assumption as to the prevalence of the *Bacillus diphtheriæ* in the Birmingham population. I therefore resolved to take swabs from a number of normal school children. For this purpose I selected two schools, and, beginning in January, 1913, took swabs from the nose and throat respectively from certain of the scholars (by kind permission of Dr. G. A. Auden, School Medical Officer, Birmingham). One school (D) had been entirely free from diphtheria for at least eighteen months, and during that time had produced only a few cases of scarlet fever. The other school (N) had produced only three cases of diphtheria during the past two years, but had been afflicted with a considerable outbreak of scarlet fever during the autumn and winter, cases continuing to occur in abundance during the time that I was taking swabs. I selected only children who gave a history of never having had scarlet fever or diphtheria. In all, one hundred children were swabbed, fifty of each sex. Half were from school D and half from school N. The ages of the hundred were as follows:—

5-6 years	16 children	10-11 years	3 children
6-7 ,,	25 ,,	11-12 ,,	2 ,,
7-8 ,,	22 ,,	12-13 ,,	8 ,,
8-9 ,,	11 ,,	13-14 ,,	10 ,,
9-10 ,,	1 child	14-15 ,,	1 child

Amongst the cultures from the hundred children Dr. Lewis found "positive" bacilli appearing to warrant further investigation in eighteen; and all of these he isolated and tested. Seven of the germs proved to be Loeffler's bacillus, as judged from microscopical appearance, and culture and sugar reactions. Of these seven, one was fully virulent to the guinea-pig, but not to the antitoxin-protected animal, and the other six only produced slight local swellings at the site of injection. The other eleven positive bacilli proved not to be the *Bacillus diphtheriæ* by the above tests. Thus amongst these school children 7 per cent. gave true *Bacillus diphtheriæ* (of which only a minority were fully virulent). It will be noticed that the Loeffler bacilli from these school children were less virulent than those from the scarlet fever convalescents.

In the school D, comparatively free from scarlet fever, only two children (= 4 per cent.) showed the *Bacillus diphtheriæ;* whereas, in the school N, where scarlet fever was prevalent, five (= 10 per cent.) did so.

The fact that such a distribution of these germs occurs in schools which are almost free from diphtheria has an important bearing on the question of the administrative action to be taken in regard to such apparently harmless "carriers" when diphtheria cases do occur.

PREVALENCE OF CLINICAL DIPHTHERIA IN BIRMINGHAM.

A point of interest in connexion with these observations is the fact that neither the post-scarlatinal diphtheria rate in the Birmingham fever hospitals, nor the diphtheria rate for the city, is high, in face of the fact that there is such a wide distribution of the *Bacillus diphtheriæ* in the scarlet fever wards of the hospitals and a constant discharge of patients with this germ from the hospitals back into the general population.

In 1910 and 1911 together the post-scarlatinal diphtheria rate in Lodge Road Hospital was 0·7 per cent. reckoned on 545 admissions, and in Little Bromwich Hospital 0·2 per cent. on 3,703 admissions. The returns for the two hospitals, however, give a higher rate for cases admitted with simultaneous scarlet fever and clinical diphtheria during those years—namely, 1·3 per cent. of scarlatinal admissions for 1910, and 3·4 per cent. for 1911. The above figures are from the Annual Reports of the Medical Superintendents [1].

The diphtheria death-rate for Birmingham (old city) for 1910, 1911, and 1912 was 0·11, 0·13, and 0·12 per 1,000 respectively, which was nearly the same as that for England and Wales generally, and less than that for many other large towns.

SECTION IV (CONCLUSIONS).

The fact that typical *Bacillus diphtheriæ* was isolated from the scarlatinally infectious "primary" cases in 25 per cent. of instances,[1] but only in 7 per cent. of those cases of scarlet fever whose return from hospital had not produced return cases, and in 7 per cent. also amongst normal school children, seems to show that the presence of this germ in the nose or throat of cases of scarlet fever is often associated with a prolongation of the period of scarlatinal infectiousness; and that the presence of the germ is indicative of an increased probability of such infectiousness. The question then arises how this is brought about.

It is well known that rhinitis (and sometimes otorrhœa) is common among the patients who produce return cases, and most observers hold the reasonable opinion that it is then the actual cause of the return case. We also know from such work as that of Todd [14] and of Williams [15] that the *Bacillus diphtheriæ* is very frequently present in such conditions. These two circumstances together may conceivably be the explanation of the association of scarlatinal infectiousness with the presence of the diphtheria bacillus.

At once we are faced with the question whether the bacillus is the cause of the rhinitis or only an association. Its invariable occurrence in the scarlatinal rhinitis investigated by Todd supports the idea that at any rate in such cases as those it is the actual cause. Cases of fibrinous rhinitis in scarlet fever are generally held to be due to the diphtheria bacillus. Graham-Smith [7] collected cases of "chronic membranous rhinitis" from various investigators, and states that all the (eighty-four) cases showed diphtheria bacilli, of which seventy-six were virulent. In atrophic rhinitis also Symes [13] found that out of twenty-three cases (mostly adults) these bacilli were present in twenty, and that both of the two that he tested on guinea-pigs behaved like virulent Loeffler bacilli. On the whole it appears probable, though not certain, that the rhinitis is the result of infection with the bacillus.

---

[1] This is in terms of houses. The corresponding figure for total "primary cases" is 23 per cent.

In my former paper on this subject I mentioned that of ninety-eight primary cases no less than sixty-seven (i.e., 68 per cent.) had suffered from rhinitis since return from hospital, as shown by nasal discharge, or sore nostrils, or by a history of "cold in the head" since return; and of these sixty-seven persons, fifty (or 74 per cent.) gave positive swabs some time after the onset of their illness.

On the other hand, a number of return cases have followed upon the return from hospital of patients who have not had any signs of rhinitis, and who yet show bacilli morphologically, like Loeffler's bacilli (in some instances definitely proved to be *Bacillus diphtheriæ*).

If the action of the diphtheria bacilli is merely to keep alive a pathological condition (rhinitis) in which the hypothetical germs of scarlet fever can continue to remain virulent, presumably this is a property shared by other organisms which can cause rhinitis (I have seen many cases of rhinitis during and after scarlet fever in which negative swabs were repeatedly given). It may be, however, that this bacillus has a peculiar property itself of enabling the virus of scarlet fever to flourish (symbiosis) even without causing rhinitis.

Bearing upon the mode of action of the bacilli, I have collected cases of scarlet fever occurring during the period (two years) under review in which the scarlet fever (confirmed as to diagnosis after admission to hospital) occurred after the return to the same house of a patient from the fever hospital who was sent in for supposed scarlet fever, but in whom the diagnosis was revised to "not scarlet fever." None of these primary cases gave any evidence either in hospital or subsequently of having contracted scarlet fever during their stay in the institution. I have not counted cases in which the first patient had clinical diphtheria.

In this series I have fourteen cases, of which twelve were swabbed after the occurrence of the return case; and of these twelve, eight were positive and four negative. Two of the three positives which were isolated proved to contain typical *Bacillus diphtheriæ*. I think these cases are particularly significant as admitting of the explanation that in contracting these bacilli, which are so prevalent in the scarlet fever hospital, the patients thereby became able to spread scarlet fever, although they themselves had not shown any signs of this disease—as if the diphtheria germ brought with it the scarlatinal virus.

It may be here stated that the hospital results have not shown the return cases to give a much higher proportion of positive results at the time of admission to hospital than cases in general. During 1911, thirty-four out of ninety-six return cases thus examined on admission gave positive results—i.e., 35 per cent. compared with 30 per cent. (both hospitals) for all cases. It should be noted that this refers to total "positives" and not to definitely proved *Bacillus diphtheriæ*, the necessary isolation not having been carried out.

As bearing upon this connexion between the diphtheria bacillus and scarlatinal infectivity, it is interesting that there is some evidence of a certain degree of clinical and epidemiological interdependence between the two diseases. For instance, it is the experience of many fever hospital doctors that scarlet fever cases are more liable to contract diphtheria than are normal children : and the two diseases seem to be more frequently co-existent in one patient or one family than mere chance would explain. The distribution of diphtheria throughout the year in this country also corresponds with that of scarlet fever, both diseases increasing in prevalence during the latter half of the year. There is also a partial tendency for the cyclical variation in scarlet fever from year to year to be accompanied by corresponding variations in diphtheria—that is to say, scarlet fever "epidemics" are often simultaneous with similar increases in diphtheria. The Birmingham figures for the past twenty years show this latter correspondence to be only partial, and there are certain other respects, such as the epidemic wave-length of the two diseases in schools, in which they are quite at variance. However, I have noticed that in schools where outbreaks of scarlet fever are occurring there are not infrequently more cases of diphtheria than usual.

The natural corollary to concluding that the diphtheria bacillus in scarlet fever cases tends, either by causing rhinitis or in some other manner, to increase the proportion of return cases, is the consideration of how to keep hospital cases free from the germ. If the positive patients were to be isolated from the negative ones on admission, the "positive" wards would have to be almost as big as the "negative" wards, and the practical difficulty would arise of the impossibility of making an accurate diagnosis in some cases of the bacillus in question without isolating and testing it. A further difficulty would arise from the definite fact that a patient may have the germ about his nose or throat without it being revealed on one swabbing. Moreover, at any rate in wards where this rigid separation is not practised, cases of rhinitis with this bacillus frequently occur, and such cases can quickly infect others in the ward who were previously negative. The nurses in scarlet fever wards are sometimes found to be "positive," and this would probably be another difficulty. Attempts to avoid discharging patients with the *Bacillus diphtheriæ* would be met by the difficulty that the condition is often very intractable and may persist a long time. I have seen cases which remained positive for more than a hundred days after discharge from hospital. I understand that the injection of diphtheria antitoxin does not clear up the germs, and I have no knowledge or information as to the more hopeful method of injecting vaccines of the bacillus.

REFERENCES.

[1] Birmingham Health Reports, 1910 and 1911.

[2] Escherich und Schick. "Scharlach," 1912, p. 161.

[3] Eyre and Flashman. *Brit. Med. Journ.*, 1905, ii, p. 1104; Graham-Smith, "The Bacteriology of Diphtheria," 1908, p. 194; Hewlett and Murray, *Brit. Med. Journ.*, 1901, i, p. 1474; Louis Parkes, *Public Health*, 1903, xv, p. 538.

[4] Garratt and Washbourn. *Brit. Med. Journ.*, 1899, i, p. 893.

[5] Graham-Smith. "The Bacteriology of Diphtheria," by Nuttall and Graham-Smith, 1908, p. 197.

[6] *Idem. Ibid.*, p. 194.

[7] *Idem. Ibid.*, p. 359

[8] Higgins. *Public Health*, 1912, xxv, p. 259: Birmingham Health Report, 1911, p. 24.

[9] *Journ. of the Massachusetts Assoc. of Boards of Health*, July, 1912

[10] Pugh, W. T. G. *Journ. of Hyg.*, 1902, ii, p. 286.

[11] Seligmann. *Zeitschr. f. Hyg.*, 1911, lxx, p. 59.

[12] Steenmeyer. Quoted by Lewandowski, *Centralbl. f. Bakt.*, 1904, xxxvi, p. 317.

[13] Symes. *Lancet*, 1903, i, p. 481.

[14] Todd. *Lancet*, 1898, i, p. 1458.

[15] Williams. *Brit. Med. Journ.*, 1901, ii, p. 1799.

DISCUSSION.

Dr. R. Dudfield wrote as follows: In 1895 I noted the frequent occurrence of nasal discharges in returned patients giving rise to "return cases," and drew the attention of Professor Simpson to the fact when he was making the first investigation for the Metropolitan Asylums Board. Professor Simpson recorded the above fact in his report to the Board. Incidentally, I may say that I am somewhat surprised that no reference is made by Dr. Higgins to the voluminous reports on the subject of "Return Cases," issued by that Board. I believe that a good deal of bacteriological research was carried out in connexion with the preparation of those reports, but I have not been able to verify that impression. Dr. Higgins records the presence of the *Bacillus diphtheriæ* in the throats and noses of primary patients, but he does not say whether any swabs were taken from the members of the families of such patients. In other words, he does not appear to have excluded the possibility of infection with diphtheria bacilli after discharge from hospital. It would be interesting to know if the secondary cases due to primary sufferers in whom the diphtheria bacillus was demonstrated at home were found to have the bacillus after admission to hospital, and if so, whether such secondary cases presented any special clinical symptoms in hospital. As to the prevalence of carrier cases in schools, Dr. Higgins has omitted to give any indication of the different proportions of "carriers" to children swabbed in the two schools. He only states that "15 per cent. gave positive swabs." It would be instructive to know whether the major portion of such positive swabs came from school D or school N, the former school having apparently the cleaner record *qua* diphtheria. I expect to publish very shortly some notes on "carriers" in schools.

The PRESIDENT (Dr. W. H. Hamer) wished to say a word with regard to Dr. Higgins's observations to the effect that there was "some evidence of a degree of clinical and epidemiological interdependence between scarlet fever and diphtheria." It was interesting to note how this conclusion came up again and again. Seven years ago Dr. Nash read a paper before the Epidemiological Society[1] on a somewhat similar subject and pointed out the same thing. He (Dr. Hamer) had the curiosity at that time to look through the *Transactions* of the Society, and it was remarkable how many papers had been read in which that interdependence had been alluded to. At the time of the great diphtheria prevalence (1858 and 1859) there were papers by Burdon-Sanderson, Ballard, and Bristowe, dealing with the subject, and a sub-committee of the Epidemiological Society was appointed with Mr. Netten Radcliffe as secretary; this sub-committee concluded that "there was considerable coincidence of time and place in the occurrence of these two diseases," and declared that this question was one well deserving further study. Dr. Ransome, too, read a paper in 1875 in which he dealt with the same topic. He, however, pointed out two difficulties; he said scarlet fever was milk-borne but diphtheria was not; that difficulty had been removed since the date of that paper; again, Dr. Ransome said that diphtheria was transmitted by sewer air, while scarlet fever was not; that difficulty also was one to which epidemiologists would not attach very much importance at the present time. There was, further, in 1883, an important paper by Dr. Franklin Parsons dealing with the same question. He (the President) considered that Dr. Higgins's paper just read afforded another proof, if proof were needed, that well-authenticated epidemiological results occasionally emerged to view even when inquirers started by assuming the specificity of particular "causal bacilli."

Dr. E. W. GOODALL said he thought the Section could congratulate Dr. Higgins on having brought before it new facts in respect of, at any rate, the prevalence of the diphtheria bacillus. The relationship between that disease and scarlet fever was very well known. Some observers of admitted knowledge had gone even further than those mentioned by the President; for instance, the late Dr. Bond, of Gloucester, had believed scarlet fever and diphtheria to be manifestations of the same disease. He (the speaker) did not take that view, and he mentioned it only to show how close the connexion had appeared to be to some observers. Dr. Higgins had proved, in reference to Birmingham at any rate, the somewhat extensive prevalence of the diphtheria bacillus, though not of the disease diphtheria. There did not seem to be in other places the same prevalence of that organism. No particular work in this connexion had been done in the hospital with which he was connected in recent years. But from work done some years ago he would have said that the proportion of diphtheria carriers in scarlet fever wards was not high; and that not many cases in which rhinitis arose after leaving the hospital showed the diphtheria bacillus. For many years past he had requested his assistant medical officers to make cultivations from the nose in chronic cases of rhinorrhœa, because in some diphtheria bacilli would be recovered. In those cases the organism was probably the cause of the chronic inflammation, and the rhinitis would often clear up after a dose or two of antitoxin. From what Dr. Higgins had said it would seem worth while to go into the subject of the prevalence of the diphtheria bacillus in some of the large London hospitals again, to see if there had been any alteration of the incidence. With regard to clinical diphtheria, he had studied the question on more than one occasion, and had read a paper before the Epidemiological Society on the subject, pointing out that if in a particular town scarlet fever and diphtheria were prevalent, cases of post-scarlatinal diphtheria would be found among the scarlet fever patients, and of post-diphtherial scarlet fever among the diphtheria patients. Post-scarlatinal diphtheria began to make its appearance in the hospitals of the Metropolitan Asylums Board in 1886 to 1888, when the disease began to be prevalent in London and just before it was admitted to the hospitals of the Board. Some years ago Dr. Meredith Richards had pointed out that they were not troubled with post-scarlatinal diphtheria in the Birmingham Fever Hospital until diphtheria began to be prevalent in Birmingham. Towards the end of his paper Dr. Higgins had said that it was the experience of many fever hospital doctors that scarlet fever cases were more liable to contract diphtheria than were normal children. But he (Dr. Goodall) was inclined to doubt that. From a twenty-one years' experience he could say that post-scarlatinal diphtheria was not so common in the wards of his hospital at the present time as it used to be, and he believed that the lessened prevalence of diphtheria in scarlet fever convalescents in hospital went with its decreased frequency in London generally. He had pointed out in his paper before the Epidemiological Society that a comparison of the age-incidence of post-scarlatinal diphtheria among the children in the hospital with the incidence among children in London generally showed that it was very little higher among the former than among the latter. He wished to ask a question concerning those patients referred to by Dr. Higgins who were found on admission to hospital not to have scarlet fever and yet contracted diphtheria bacilli in the hospital. He asked whether those cases had been treated in isolation wards or among the other scarlet fever patients? At Homerton a very careful clinical examination was made on admission, and where there was any doubt the patient was placed in an isolation ward and kept there for three or four weeks before being sent home again. It would be a curious fact if the patients in the Birmingham Fever Hospital were found to have acquired diphtheria bacilli even though they had been treated in isolation wards.

---

[1] "Evolution in Relation to Disease," *Trans. Epid. Soc. Lond.*, 1905-6, n.s. xxv, pp. 201-44

With regard to the treatment of these cases, the diphtheria bacillus was fairly frequent in Birmingham; it was one of the common flora of the nose, especially of scarlet fever patients in the Birmingham fever hospitals. Whether that was so now in London he could not say, as he did not know of recent work on the subject. But what treatment should be carried out? If one had an enthusiastic assistant medical officer who swabbed every throat and nose and wished to isolate every case in which the bacillus was found, the isolation accommodation would soon have to be doubled. He had long given up isolating bacteriological cases in separate wards. In such cases he carried out what was termed the "barrier" treatment—i.e., he kept the patient in the general ward, but adopted measures to keep everything for his separate use. Under those circumstances the disease did not spread. In the absence of any marked increase in the "return case" rate of scarlet fever he doubted whether the diphtheria bacillus had much to do with "return cases" of scarlet fever, and therefore he did not think that measures directed to the elimination of diphtheria bacilli from scarlet fever convalescents were necessary. As a matter of fact, all such measures as had hitherto been tried were quite unavailing. While he believed that the diphtheria bacillus was the cause of diphtheria, facts such as these brought forward by Dr. Higgins only went to show how little we really knew at present of the conditions that favoured the pathogenicity of that organism.

Dr. F. THOMSON said his views largely coincided with those expressed by Dr. Goodall, and there were very small differences in the ways their respective hospitals were conducted. Perhaps he (the speaker) isolated more cases in which the bacilli were found in the throat, and, on the whole, he did more cultivations, including all cases of rhinitis in scarlet fever. He did not now find the organism in a high proportion of cases: the percentage used to be higher. About eight years ago post-scarlatinal diphtheria became rather suddenly less frequent in the wards of the fever hospitals. In his establishment they started making cultures from the throat and nose of every patient admitted, three or four for each patient, and every case in which the diphtheria bacillus was found was put into a separate ward. Then there was found to be but little post-scarlatinal diphtheria in the wards, and they were congratulating themselves on their improved statistics, when it was found that the result was practically the same at other hospitals where this had not not been done. He asked Dr. Higgins whether the cases given as negative had more than one swab examined. Unless that were so he did not see much value in the negative figures. He did not regard post-scarlatinal diphtheria as so very prevalent after all, certainly not so prevalent as it was some years back. His experience was that diphtheria was more common in association with measles than with scarlet fever. In the way of treatment he had tried all sorts of things, especially for the chronic "carriers," but failed. He had also tried various vaccines, with the same absence of result. Latterly he had been trying *Staphylococcus aureus* broth culture; but five weeks' treatment of a noted London carrier had had no result.

Dr. T. G. MACAULAY HINE: In the first place I do not like the term "positive" being used in regard to cultures merely showing Neisser-staining bacilli, some of which latter proved not to be the diphtheria bacillus. Also it is not very uncommon to find bacilli showing metachromatic granules which are non-Gram staining, but no mention of this stain is made, but only of carbol thionin as a simple stain.

I wish now to examine some of Dr. Higgins's figures. He says he has examined about 380 cases by swabs from his "primary" cases, and out of these he had secured 115 "positive" reports of the presence of *Bacillus diphtheriæ*, or 38 per cent. He then remarks that some doubt having been cast on the identity of the organism seen, a series of thirty "positive" cases was properly investigated and thirteen of these proved to contain the Klebs-Loeffler bacillus. Of these thirty cases the organism could only be isolated in twenty-two, and the percentage of the true bacillus was therefore 60 Now he uses this figure later on in connexion with his total cases, and therefore, supposing he is right in doing this, I consider he should have called it thirteen in thirty positive swabs and not thirteen in twenty-two—i.e., the percentage should be 43·3. Applying this figure, the best percentage he can claim is 16·6 of *Bacillus diphtheriæ* of the total cases examined, and this for another reason, I consider, is still too high. The other reason is that there seems to me to be a possible, and even probable, source of error in that we all know that by far the most common location of the true bacillus is in the throat, and that the chief habitats of the diphtheria-like bacilli which are more frequently mistaken morphologically for the Klebs-Loeffler bacillus, are the nose and ear. Now Dr. Higgins gives the source of the bacilli found, both in his total cases and in the cases accurately examined in which the *Bacillus diphtheriæ* was identified, and I here place these two series side by side. (I have, of course, subtracted his proved cases from the totals.)

Source	Identified	Unidentified
Nose ..	6	106
Ear	—	5
Nose and ear ..	1	3
Throat ..	1	3
Nose and throat	4	15
Nose, throat, and ear ..	1	—

The above table shows that these series are very disproportionate, and as he claims to apply his figures of his identified ones to the unidentified ones, I consider that they should show more correspondence in their sources—e.g., the figure for the "nose alone" should be nearer eighteen than 106 if they are to be considered comparable.

My reasons, I repeat, for making this point are that, firstly, we know that the bacilli from this region, the nose, are the most fruitful in causing error, that the organisms properly investigated differ so materially from those in the total figures as regards their source, and that 106 out of 112 were only diagnosed from their morphological resemblance to the Klebs-Loeffler. This seems to open too wide a field for error, and I therefore do not consider Dr. Higgins is justified in applying the figure of the small series to the total numbers. I feel that if all the organisms had been properly investigated, he would not have more than 10 per cent. instead of his 25 per cent. The experience of other observers, which he quotes himself, seems to bear this out.

The whole position seems to be dominated by the bacteriological diagnosis of the *Bacillus diphtheriæ*. If, either for reasons of time or expense, the bacteriologist be asked to make a diagnosis on the examination of swabs combined with a single culture alone, there is bound to be a certain number of mistakes, even by experienced observers; these mistakes are generally in the right direction, for the true bacillus is rarely overlooked and the error is nearly always in giving a positive report, when a more prolonged and expensive investigation would justify a negative one.

The identification of the *Bacillus diphtheriæ* by the whole of its characters when completely investigated is admittedly quite reliable, but from practical consideration it is impossible to adopt this as a routine method. The preliminary identification of the bacillus by a small portion only of its characters is known to be open to error, especially in the case of cultures not from the throat, and when the examination is confined to the microscopic appearance of a film from a swab alone the report is practically valueless.

I have spent considerable time during the last six years in investigating this question of the identification of the Klebs-Loeffler bacillus, and, as the result, I have been engaged latterly in attempting to devise a special medium by which the bacillus may be recognized more quickly and surely than it is at present on the usual Loeffler's serum, and with some promise of success. Earlier in this year I communicated to the Pathological Society the results of some of my investigations into the biochemical reactions of the *Bacillus diphtheriæ* and five or six other members of this group. I feel sure that much might be accomplished by a well organized research on these or similar lines, and any method which would make these examinations less expensive, and at the same time as reliable and more expeditious, would be generally welcomed.

In criticizing Dr. Higgins's paper as to the existence of the *Bacillus diphtheriæ* in the proportions suggested, I do not want it to be thought that I wish to disagree with his conclusions altogether. The frequency with which the members of the diphtheria-like group are associated with chronic irritations, as in nasal sinusitis, in combination with the gonococcus in old urethritis, and in sinuses arising from old abscesses, seems to indicate that these organisms may have more than a purely passive rôle, and it may well be that their occurrence after scarlet fever in the discharges from the nose and elsewhere has some connexion with the continued capacity of these cases to infect others, as Dr. Higgins suggests. The position I feel inclined to assume is that I look upon the whole group with suspicion; other members have already been proved to have a pathological action, notably the *Bacillus coryzæ segmentosus* in a certain type of "colds," and the *Bacillus paralyticus* of Ford Robertson is at least pathogenic to rats. I therefore see no reason why other allied organisms should not eventually be convicted of causing disease.

Dr. S. Monckton Copeman said he had been struck by the fact that although there was this enormous proportion of cases carrying diphtheria bacilli, yet none of the return cases had diphtheria clinically. That seemed to show that we were yet far from knowing everything with regard to the ætiology of either diphtheria or scarlet fever. Many of the cultures, although said to be positive, did not respond to the special tests for the diphtheria bacillus on culture; and he felt inclined to agree with the President's scepticism as to the importance of the demonstration, in the throat or nose, of such bacilli, certainly in those cases from whom swabs did not give a positive reaction in test cultures and in many of those which did. He agreed with Dr. Hine in not regarding as worthy of note any organism which did not give a positive result when inoculated into the guinea-pig. They might have been derived by inheritance from virulent bacilli; but it was now recognized that although it was comparatively easy by the use of selective culture media to reduce the virulence of a micro-organism, it was not by any means as easy to increase it. If the tests detailed were to be carried out in every instance it seemed that a tremendous amount of time and labour would be entailed, and it was fitting to ask whether it was worth while. Much was said about positive diagnoses being given in diphtheria, but probably not one in a thousand dealt with the full tests such as had been described. With regard to getting rid of the organism, it was known that antitoxin had no effect on the organism itself, except indirectly by neutralizing the toxin secreted, and therefore one could not expect to clear out these organisms from the throat merely by the administration of antitoxin. With regard to vaccines, he would refer to the results of experiments conducted at the instance of the Local Government Board in regard to skin organisms, which were probably in an analogous position, because diphtheria organisms in like manner were only found on the surface of tissues. On his initiative Colonel Sir Wm. Leishmann and Major Cummins carried out an enormous amount of work in connexion with the Government Vaccine Establishment, to see if it was possible, prior to the collection of lymph, to purify it from extraneous micro-organisms by the use of autogenetic vaccines, prepared from the cocci normally found in the lymph, prior to glycerination. Somewhat unexpectedly, however, no result was obtained as regards diminution of the bacterial flora, although it was a laborious and detailed investigation, such as had not, he thought, been undertaken before. Therefore he did not think vaccine or staphylococcic preparations were likely to be of any service in the destruction of the diphtheria organism. Until more was known about the micro-organism of scarlet fever—on which much work was being done at the present time—he did not think it was possible to draw a definite conclusion as to the precise inter-relationships of this disease with diphtheria.

Dr. F. G. Crookshank said although in 25 per cent. of the author's cases the Klebs-Loeffler bacillus had been found, what was found in the other 75 per cent.? Because if in any considerable number some common organism such as a staphylococcus was present, the conclusions which had been expressed in respect of the Klebs-Loeffler bacillus might with equal force have been applied to that other organism. He, however, regarded Dr. Higgins's work as very important, so far as it went. He feared that professed bacteriologists had fallen into a habit of investigating flora of the throat from the point of view of the presence or absence of one special bacillus. What was really needed was complete knowledge of flora of the throat in any particular case. It had been shown that one did not often find staphylococcus infection associated with diphtheria; yet it was very common to have staphylococcus infection associated with scarlet fever. In view of the restraining power of the staphylococcus over the diphtheria bacillus, he thought that point should be followed up. One explanation seemed to have been omitted from the paper—namely, that the diphtheria bacillus persisted in some of the scarlet fever cases, for the simple reason that scarlatinal rhinitis afforded a favourable medium in which diphtheria bacilli could grow, perhaps in a quiet and unobtrusive way. The association between scarlet fever and diphtheria was perhaps not a necessary one, though not the result of pure coincidences. He suggested there was perhaps lurking in the background some other factor. He felt in general agreement with Dr. Goodall's remarks. When he (Dr. Crookshank) had charge of an Isolation Hospital, he used at first to swab every diphtheria case two or three times before sending it out: and he felt that in doing this he was acting very conscientiously. But afterwards he felt convinced that this work was quite supererogatory, and he did not remember having seen a return case of diphtheria either if the throat had been swabbed or if it had not. In many of the cases of scarlet fever in which the diphtheria bacillus was found in the throat, there was doubtless a "tolerance" of the latter organism, and the patient was even less likely to contract the disease than anyone who at the moment had not got the organism. Although, however, one might disagree with some of the conclusions that Dr. Higgins had submitted, or feel that the information he had given was not quite complete enough to justify definite conclusions being drawn, he would deprecate the suggestion of Dr. Copeman that such collections of facts involved a large amount of useless labour. From the point of view of immediate clinical result it might seem so, but from the standpoint of the scientific investigator work of this kind should not only be repeated, but multiplied many times.

Dr. HIGGINS, in reply, said that the completed results of the swabbing of school children, which were not included in the uncorrected proof that Dr. Dudfield saw, showed that the school (N) where scarlet fever was epidemic did furnish a larger proportion of children with diphtheria bacilli (10 per cent.), than the school (D) where scarlet fever was not epidemic (1 per cent). In regard to Dr. Dudfield's other question, it was not found that the corresponding primary and return cases always agreed as to the presence or absence of the diphtheria bacillus.

In reply to Dr. Goodall he said that the non-scarlets who caused return cases had been kept in isolation wards, but in most cases had been exposed to scarlatinal infection.

In answer to Dr. Hine he said that in the majority of cases no further swabs were taken after a negative result was obtained, and agreed that a single negative result had not the value of a positive result. With regard to the criticism of the way in which he arrived at the figure 25 per cent., he contended that the method he pursued was a legitimate one—namely, to isolate all of a consecutive series of positive results and apply the percentage of true *Bacillus diphtheriæ* thus found to the total positives for the two years during which the inquiry lasted. Of course the result was an approximate estimate, but, as mentioned in the paper, it was supported by the fact that the same proportion of true diphtheria bacilli was actually isolated by Dr. Lewis from the primary cases from the northern half of the city during the time that the consecutive series lasted. If in thirty positive swabs the Neisser-positive bacillus was successfully isolated in twenty-two cases only, the percentage of true *Bacillus diphtheriæ* found should be reckoned on the twenty-two and not on the thirty, as he knew of no reason for supposing the diphtheroid bacilli to be more difficult to isolate than the true Loeffler bacilli.

In answer to Dr. Copeman and Dr. Dudfield he stated that there was a certain number of cases of clinical diphtheria associated with the return cases of scarlet fever. From December 19, 1910, to November 8, 1911, in which time 151 return cases occurred (in eighty-nine homes), in four instances the return case was admitted to hospital with clinical diphtheria as well as scarlet fever, and in one other instance two return cases of pure scarlet fever in one family were associated with a case of diphtheria occurring in the house at the same time. In addition three cases of pure diphtheria followed as return cases upon the return from hospital of cases of scarlet fever. None of the primary cases of scarlet fever whose return was followed by the eight cases of diphtheria above mentioned had clinical diphtheria, but six of these gave positive swabs.

In acknowledging his indebtedness to Dr. Lewis for the bacteriological work reported in the paper, Dr. Higgins mentioned that he believed Dr. Lewis was attempting to classify the various strains of Loeffler bacilli that he had obtained.

[*Note by Dr. Higgins.*—The figures which Dr. Hine worked out with regard to the site (nose or throat) from which the germs were obtained are very interesting, but his use of them to show that the proportion of true Loeffler amongst the consecutive series of thirty "positives" ought not to be applied to the total "positives" is not justified. The comparison in this respect ought to be between the series of thirty and the total "positives" and not between the eleven cases with proved *Bacillus diphtheriæ* and the total positives. As a matter of fact, amongst the thirty "positives," twenty-nine showed the germ in the nose or ear and five in the throat. This proportion of 29 : 5 is almost precisely the same as 141 : 24, which obtained amongst the total "positives." I therefore regard Dr. Hine's interesting method of analysing the figures as lending support to my thesis rather than the reverse.]

Section of Epidemiology and State Medicine.

May 23, 1913.

Dr. W. H. Hamer, President of the Section, in the Chair.

Anthrax in the Woollen Industry, with Special Reference to Bradford.

By F. W. Eurich, M.D.

While fully recognizing the honour you have done me in asking me to read a paper on "Anthrax" before your Section, I hesitated to accept the invitation, as my own interest in the anthrax problem has been confined to certain local issues, and because the whole problem has been so exhaustively dealt with by Dr. Legge not so very many years ago. The investigations, moreover, which are being carried on in Bradford are not yet completed. However, as your Secretaries agreed to accept the risk, it would have seemed uncivil to decline.

New industries, it is well known, often introduce new diseases. With the introduction of alpaca, mohair and the various Eastern wools into the factories of the Bradford district in the first half of the last century there appeared among the operatives forms of bronchitis, pneumonia, and so-called blood-poisoning of a peculiar deadly nature. The workpeople were quick to associate these outbreaks with the manipulation of this foreign material, but the medical profession was, as a body, slow to recognize in them specific features. A notable exception was Dr. J. H. Bell. Long before bacteriological investigations proved the specific nature of these cases he resolutely defended this view. On one occasion he even risked legal proceedings by inserting in a death certificate that the disease had been contracted owing to the employers' neglect in taking adequate precautions. He was, however, by no means clear what these adequate precautions were. His discovery in 1879 that wool-sorter's disease is a form of anthrax was the outcome of a suggestion thrown out by his friend Dr. Eddison, of Leeds, then fresh from the bacteriological laboratories of the Continent. Some years later a conference of representatives of employers, workpeople, health committee, and the medical profession took place, and certain regulations, known as the Bradford Rules, were drawn up. These earlier regulations were carried into effect voluntarily, and formed the basis for subsequent regulations made, and at various times amended, by the Home Office. These precautionary measures—the general tenor of them will be considered later—had a prompt and beneficial effect. The number of cases, especially those of the pulmonary variety, has been greatly reduced; but this reduction has occurred almost solely among those workpeople whose duty it is to handle the raw material before it has been washed. Even among this class of operatives cases still occur, and no subsequent amplification of the original rules appears to have had any pronounced effect upon the rate of incidence or upon the mortality from this disease.

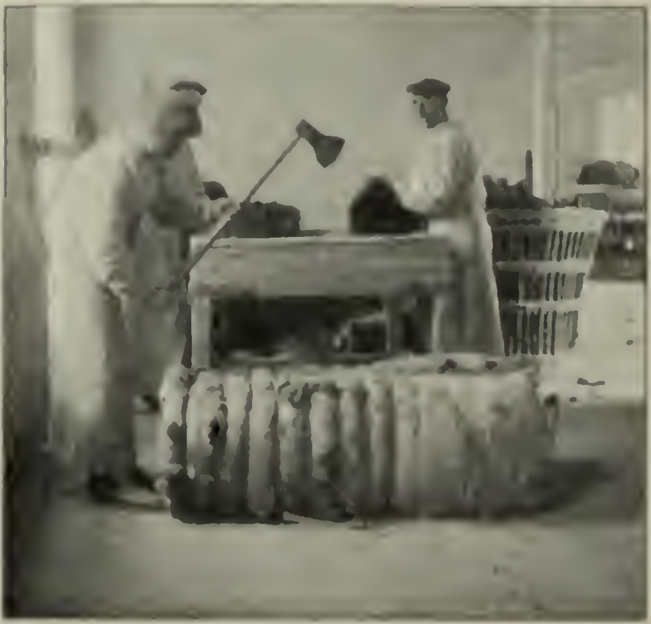


Fig. 1.

Breaking the iron hoops that bind many bales. In the background are two men busy opening fleeces; the funnel-shaped receptacle under the table, for the dust, is connected with an extracting fan.

It was evident that some important factor in the production of anthrax had not received due attention. What this element in the

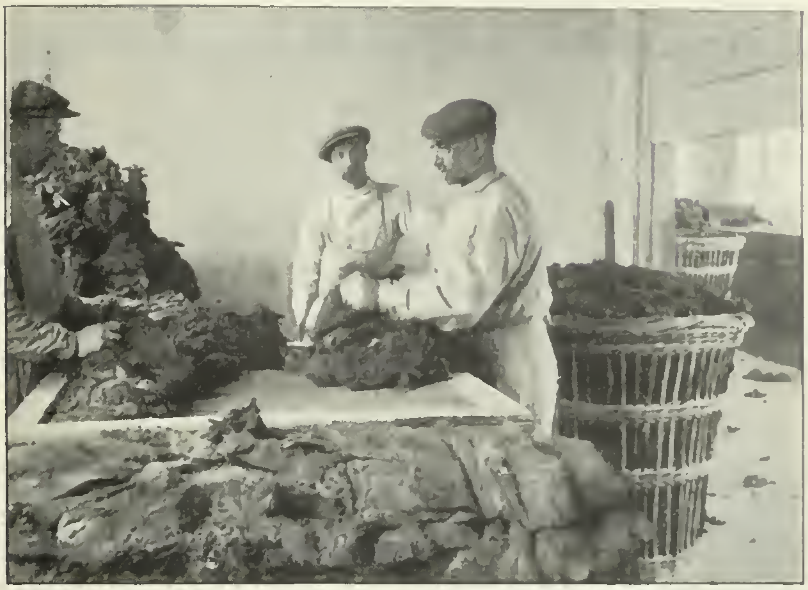


FIG. 2.

Opening the fleeces upon an "opening board"—i.e., upon a wire grid through which the dust is drawn by means of a fan.

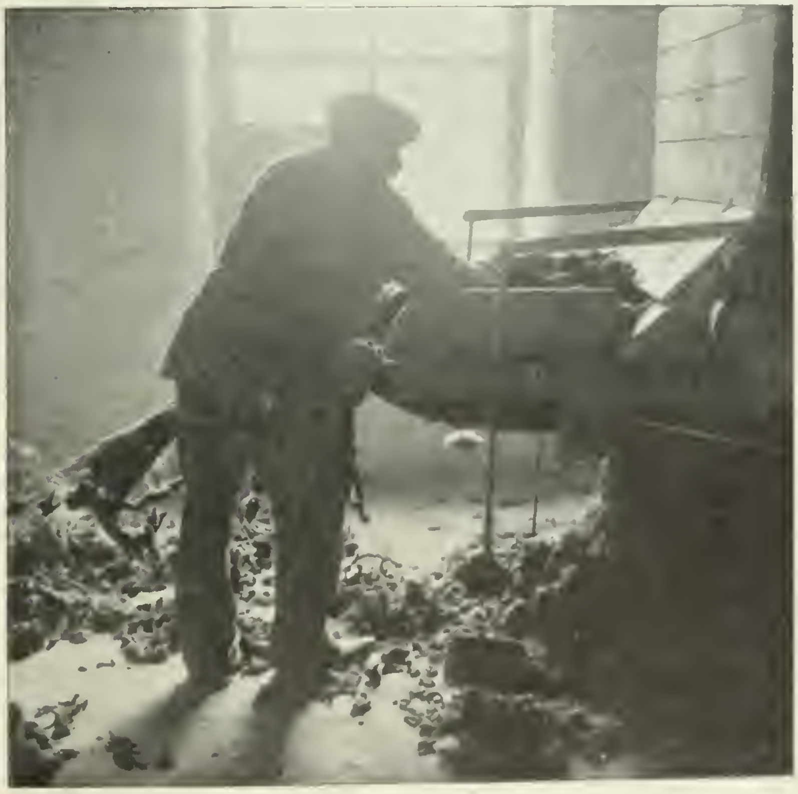


FIG. 3.

Sorted wool being placed upon a lattice and pushed along it into a willey machine. Note the intimate (and unnecessary) contact of the man with the material, as is also the case in the next figure.

causation of anthrax might be, and what further means of prevention could be adopted, were the main problems. To solve these, the Anthrax Investigation Board was formed.

Before giving you some of the results of these investigations, let me sketch, very briefly, the various processes through which alpaca, mohair—i.e., the hair of the angora-goat—and wool generally pass prior to being spun. The raw material arrives in bales, often, though not invariably, press-packed and bound with hoops of iron. When the bale has been opened the fleeces, which are rolled up and often tied with knots, are taken out singly, opened out, thrown into large baskets, and passed on to the sorter. It is the sorter's duty to separate the various qualities of wool of which a fleece is composed, and to pick out foreign substances, such as locks, bits of rag and string, so often found within a fleece. The wool may then be taken direct to the wash-bowl, or it may first be passed through a "willey"—a machine in which the material is roughly torn and shaken out, in order to extract the coarser kinds of sand and dirt. The extent to which wool

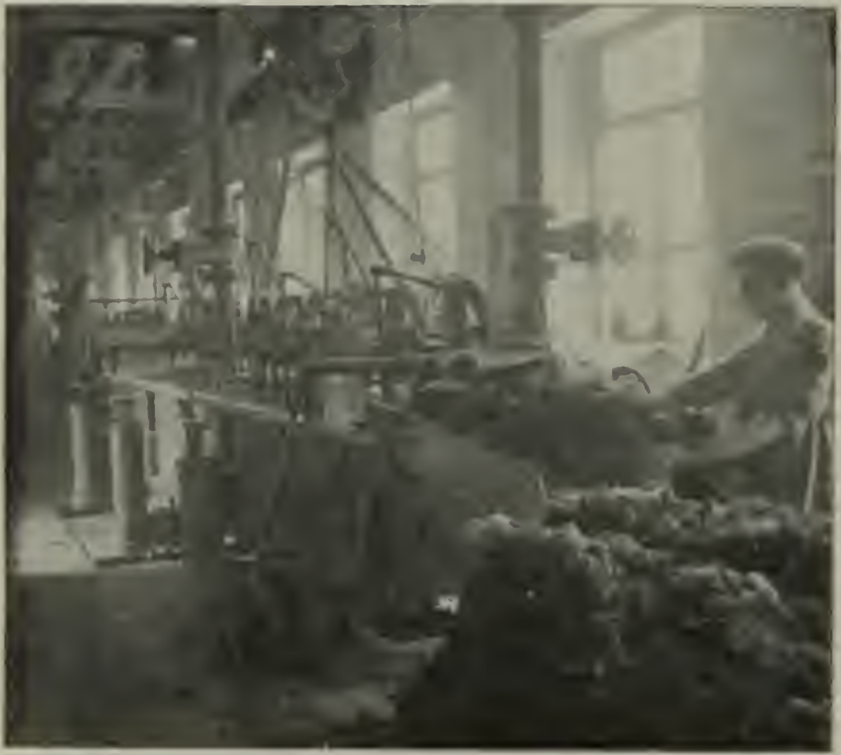


FIG. 4.

A workman is shown with a pile of wool at his feet, from which he is feeding a washbowl, spreading the material upon the feeding lattice.

may be washed will depend upon the use that is to be made of it. According to this, and also according to the nature of the material, the temperature of the water and the quantity of the alkali mixed with it will vary. In most cases the temperature of the bath is about 130° F. The wool remains in the wash-bowls about ten to twenty minutes, is passed into a drying machine, is often willeyed a second time, and in a more searching manner, and then passes to the carding engines. These machines consist of a series of rollers, set with teeth and arranged in such a way that the wool as it passes between each set of rollers has its fibres opened out and arranged in parallel bundles, with the result that it issues from the machine in the form of a loose rope called a "sliver." As a good deal of the natural fat of the wool is removed in the process of washing, a little oil is added to the wool as it passes through the carding-engine. A similar effect to that obtained by means of carding is got by passing the wool through what is called a preparing box; in this, too, the wool passes between rollers, and is

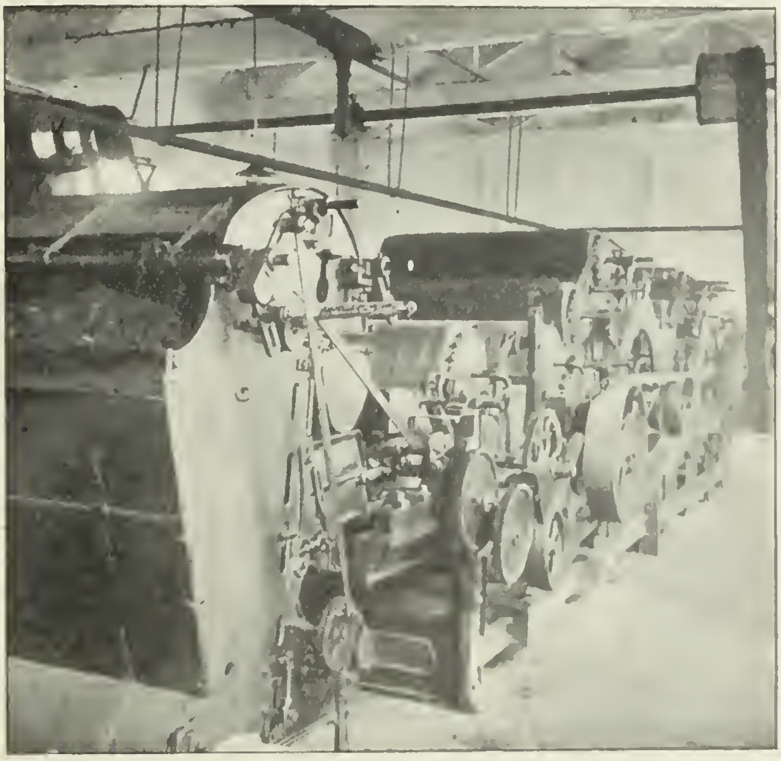


FIG. 5.

A carding engine. The wool is seen in the feeding receptacle on the left (filled by hand), and can be traced upon the rollers farther on as it passes between them. The rollers revolve at various speeds. Note the absence of any cover and of any extracting fan.

teased by sharpened points, but with this difference, that these points are not upon the rollers but travel quietly in the horizontal plane. It follows that this process of "preparing" is less violent than that of carding, and that almost no dust is thrown up into the air. The wool may then be combed in various ways. By it the wool fibres are straightened out, and the shorter fibres are separated from the long. The combed product is called the "top." Such fibres as are altogether too short to be combed are separated out by the machine, and constitute what is called the "noil." In all these processes, the washing alone excepted, a certain amount of dust is given off. The regulations provide that during the processes of opening and sorting the dust shall be drawn away from the workers by means of down-draughts created by extracting fans beneath the opening screens and the sorting boards; but there are no regulations for enforcing similar precautions in stages following upon the washing.

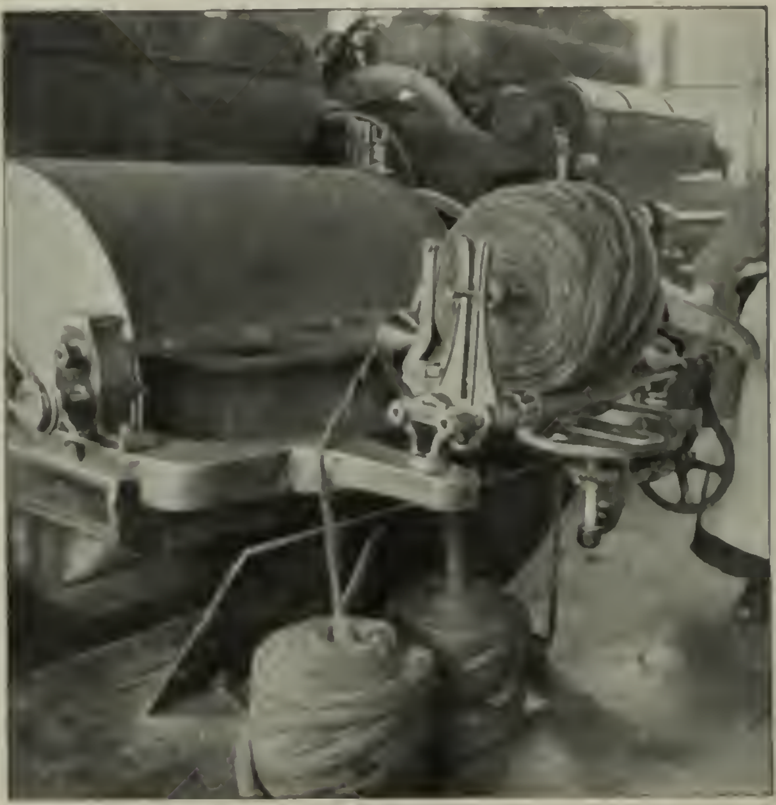


Fig. 6.

Showing the opposite end of the same carding engine, the wool issuing in the form of a loose rope or "sliver," and being wound up into a ball.

Let us now turn to the cases. I have full records of 110; of these nineteen belonged to the internal variety; they all died. Ninety-one were of the external type; of these thirteen ended fatally. The sites of the pustules are indicated in the following table:—

TABLE I.—SITES OF PUSTULES.

The figures in parentheses give the number of fatal cases.

Crown of head	1	
Forehead	9	
Temple	2	
Nose	1	
Cheek	13	(1)
Ear	2	
Inside nostril	1	
Behind ear	2	
Corner of mouth	2	
Eyelid	1	
Chin	2	
Lip	1	
Neck	28	(7)
Upper arm	1	(1)
Elbow	1	
Forearm	10	
Wrist	7	(3)
Back of hand	2	
Finger	2	
Knee	1	
Buttock	1	
Ankle	1	(1)
	91	(13)

The frequency with which the pustule occurs on the face, neck, and upper limbs is again brought out by this table. The relation of the severity of the case to the site of the pustule (the fatal cases alone are specially noted in the table) is interesting. Some of the figures are, of course, too small to be of much value, but it is worthy of note that the severest cases occur not only where there is a greater looseness of the cellular tissues, but in parts which admit of the freest movement. Compare, for instance, the relatively high mortality accompanying pustules on the wrist and the mild course generally run when the forearm is the seat of the mischief. The only case of malignant pustule on the ankle which I have seen ended fatally. I am convinced that to insure absolute rest to the part affected is an indispensable part of the treatment.

In the first three years the opsonic index was estimated in almost every case of malignant pustule—generally every day till the patient either died or was out of danger. The index is low during the active stages of the disease, and rises to normal or above normal after the pustule has been excised, or when spontaneous recovery takes place.

In one case the opsonic index rose after excision of the pustule, but quickly fell again, although the patient made no complaint; the dressings were removed, and it was found that a second infection had taken place at the site of operation; this, too, was excised, and the patient made an uneventful recovery. I have had no opportunity of testing the diagnostic value of the opsonic index in cases of internal anthrax, as I have never been called to see one before the infection had become generalized. It should be a useful aid to diagnosis in early cases, for I have several times been able to see the primary focus in a bronchus, twice in the tissues between the root of the tongue and a tonsil, and once in the stomach. Merely a microscopical examination of the serum or of the blood is, of course, insufficient for diagnosis; cultural methods should be employed in all cases. But failure to cultivate the bacillus does not preclude the possibility that the case is one of anthrax. Decomposition of the material, or the bactericidal property of the serum, may explain the failure. To reduce these fallacies to a minimum it is advisable, when such material has to be sent any distance, that some of it should be dried on to sterilized silk threads, or on to glass rods, and packed into test-tubes containing a few grains of chloride of calcium.

As to the treatment I need say little. Our surgeons practise excision of the pustule whenever that is possible, and this is almost invariably combined with the injection of Sclavo's serum. During the last three years, following Professor Sclavo's advice, I have advocated its use in doses of 80 c.c. given intravenously, followed in twenty-four hours by a dose of 60 c.c. if the case be a severe one. Should this treatment be refused by any patient—but I know of no case in which this has happened—I would recommend the trial of a vaccine. It is difficult to estimate the efficacy of any line of treatment, or to say how far it was affected by delay on the part of the patient in seeking medical advice, or by failure on the part of the doctor to recognize the nature of the disease. In this respect the fatal cases are very interesting. Of the nineteen cases of internal anthrax four had had no medical attention whatever, and eight were already moribund when skilled advice was sought. In not one of the remaining seven cases was the true nature of the illness suspected until the patient had passed into the state of collapse; indeed, in two instances it was the unexpected sudden death of the patient which first roused suspicion. Turning to the thirteen fatal cases of malignant pustule, I find that one patient had not sought skilled advice; in one case anthrax was not diagnosed till the eighth day of the disease; in three instances advice was not sought till the fourth day, and in five not till the third. In only three cases was it sought within the first twenty-four or thirty-six hours, and of these, two were cases of erysipelatous anthrax, while in the third case death was probably accelerated by cirrhosis of the liver. A comparison of these with the cases that ended in recovery is very instructive. I have notes as to the dates of the first medical attendance and correct diagnoses in seventy cases. The accompanying table (*see* Table II) shows how with the lengthening interval between the first appearance of symptoms and the date of medical attendance the number of the moderately severe and of the severe cases increases. After the third day, however, the mild cases, and those which were undergoing spontaneous cure, gain the upper hand, while severe cases cease to occur; finally only cases undergoing spontaneous cure come under observation.

TABLE II.—SHOWING RELATION OF SEVERITY OF CASE TO DATE OF FIRST MEDICAL ATTENDANCE. ONLY CASES THAT RECOVERED ARE CONSIDERED.

Day of disease	Spontaneous cure	Mild	Moderate	Severe
First ...	... — ...	— ...	6 ...	—
Second ...	... — ...	3 ...	8 ...	5
Third ...	... 1 ...	7 ...	15 ...	3
Fourth ...	... 2 ...	9 ...	3 ...	—
Fifth ...	... — ...	— ...	2 ...	—
Sixth ...	... 2 ...	1 ...	— ...	—
Seventh ...	... 1 ...	— ...	— ...	—
Thirteenth	... 2 ...	— ...	— ...	—

The total number of cases of anthrax, the outcome of contact with wool and hair in the Bradford district during the last ten years, has been 133. Some years ago Dr. Legge calculated that on the number of workpeople exposed to risk the comparative figure of attack was 1·3 per cent. This calculation was based upon the total number of people engaged in the sorting and combing of scheduled—i.e., of black-listed—wools, but did not take into account that the number of hands engaged in the various processes, respectively, to which the raw material is subjected up to and including the combing, is not the same. Nor can the risk of infection attaching to the various occupations be the same. It may be a coincidence, for the figures are small, but out of four card-grinders employed by a certain firm two contracted anthrax in the course of eighteen months. It is also interesting to note in this respect that out of a total of 106 patients, whose length of employment was determined, forty-nine had been exposed to risk for only twelve months or less. Workers of low-class wools are naturally, perhaps, a somewhat shifting population; they pick up such work as offers and readily abandon it again. But so far as my inquiries have gone, the average length of employment in the different departments will not explain these figures. They *may* be accounted for on the supposition that a certain degree of immunity is in time acquired. I have noted, for instance, several cases who left their employment after a few years' service, but, returning after an interval of some months, contracted the disease. Such relative immunity might be conferred by the introduction of germs of low virulence, such as may undoubtedly be found in wool. I have examined the blood of a number of long-service hands, but failed to discover any difference either in the opsonizing power or in the bactericidal property of the sera. The occupation of the 110 patients is given in the following table:—

TABLE III.—SHOWING OCCUPATION OF CASES OF ANTHRAX.

The figures in parentheses give the number of fatal cases.

Warehousemen	4	(1)
Wool-sorters	22	(5)
Wool-pullers	2	(2)
Wool-runners	3	(1)
Washbowl-feeders and wool-washers	13	(5)
Wool-dryer	1	(1)
Willeyers	11	(2)
Carders	20	(5)
Card-grinder	6	(2)
Box-minders	3	(2)
Finishers	2	
Combers	10	(3)
Picker-up	1	
Packer of tops	4	(2)
Shoddy willeyer	2	
Spinners	4	(1)
Mechanics	2	

from which it will be seen that sixty-six cases occurred among work-people who would come in contact with the wool or hair after it had been washed. Now the dust which can be shaken from wool before it is washed consists to a large extent of soil mixed with a little fluff; but in the later processes a fine dust of broken fibres predominates. If we are to associate the anthrax spores in wool with the presence of dust from the soil, then it is difficult to understand the frequency with which anthrax is contracted in the later stages of the combing process; it would be difficult to understand why, e.g., this sample of white, East

Indian wool, washed so beautifully clean, should still be full of the spores of anthrax, as it is. Nor does washing, though it necessarily removes many of the spores of anthrax, remove so many of them, relatively, as it does of other dust organisms. The obvious explanation of this is to be found in the adhesive property of blood. If blood-stains upon wool or hair are not too old, then the hæmoglobin is readily extracted by the alkali in the washbowl, but albuminous constituents may remain, and will glue the spores to the wool-fibres. When the blood-stains are old, then even thorough scouring will not delete them; hence even the best washed materials may retain, in part at least, their power to infect. Practically all the difficulties of the anthrax problem centre around this matter of the contamination of wool and hair with infected blood. The wool-combing regulations, as in force to-day, aim (1) at the exclusion from manipulation of obviously dangerous fleeces, and (2) at protecting the worker from the dust during the opening of bales, and during sorting and willowing. They apply to certain black-listed materials only—to raw material grown in countries in which anthrax is known or suspected to be rife, and in which, for one reason and another—such as administrative incapacity, carelessness, &c.—no adequate precautions are being taken to prevent the inclusion of tainted fleeces. Hand in hand with such lack of precautionary methods and of supervision will go the perpetration of "false packing"—i.e., of the inclusion within a fleece of so-called "locks" and "pieces," by which are meant short strands of wool of inferior quality, not infrequently the sweepings of the knacker's yard, mixed, may be, with rags and bits of string. The extent to which false packing occurs can be seen from the following figures: 961,116 lb. of Baghdad fleece wools yielded 747 lb. of blood-stained "locks," 380⅓ lb. of blood-stained "pieces," and only 18⅕ lb. of blood-stained fleece; 260,843 lb. of Bussorah fleece wools yielded 26¾ lb. of blood-stained "locks," 424 lb. of blood-stained "pieces," and only 6½ lb. of blood-stained fleece. Of course, not all these samples have been tested for anthrax, but the percentage of positive results is considerably higher in locks and pieces. As many of the samples tested had been for various reasons specially selected, a comparison of the percentages might not be altogether a fair one. The importance of the rôle played by locks and pieces may be made clear by means of the following calculation; the average frequency with which anthrax spores have been detected in blood-stained Persian wool of every description during the past four years is 4·3 per cent. If I now make a calculation which will favour locks and pieces to the utmost—i.e., if I assume that every blood-stained fleece is infected, and of the locks and pieces only 4·3 per cent.—even then Bussorah locks and pieces are four times, and Baghdad locks and pieces 2·7 times, as dangerous as the fleeces.

The prevention of "false packing," then, would greatly diminish the risk of contracting anthrax from fleece wool; but how can we expect to find the necessary conscientiousness in Asia Minor or Persia, where human lives are valued so lightly?

The risk in fleece wool would be reduced still further if dangerous fleeces also could be excluded from manipulation. The Regulations provide for this in requiring that the so-called "fallen" and "damaged" fleeces be sought for by men skilled in detecting them, and are to be specially treated. Possibly as the result of a misunderstanding these terms "fallen" and "damaged" appear to be used in the Regulations in a different sense to which they are employed in actual practice. In the wool industry a fleece is considered to be a fallen one when of a peculiar dead lack-lustre appearance—an appearance due to prolonged exposure after the death of the animal. But the longer this exposure the more advanced will be the decomposition of the carcase; and as the bacillus of anthrax perishes as putrefaction advances, a "fallen" fleece will be less dangerous the more characteristic its appearances are. Similarly, a "damaged" fleece is not a blood-stained fleece, but one that has been damaged by contact with sea-water. Such a wetting will prove dangerous only if the fleece be already anthrax-laden; under the influence of warmth and moisture multiplication of the virus takes place, but from experiments I have made it would seem that the multiplying germs do not pass any great distance—scarcely more than a centimetre into the surrounding wool. Such a restriction to the distribution of the bacilli is possible only when a fleece becomes sea-damaged when in the bale, or otherwise tightly packed. Under other conditions the story is a very different one. Now one of the provisions for laying the dust arising during the opening and sorting, as demanded in certain cases of the Regulations, is steeping. Wool that has been steeped is, however, put so promptly through the processes of washing and drying, that germination of the spores and multiplication has scarcely time to proceed. But one objection to damping the wool is that the detection of blood-stains is rendered difficult. However, this difficulty might be overcome when mohair or white wool is being dealt with. But when wool is steeped loosely and becomes thoroughly drenched, blood-clots are softened, portions of them break away and may attach themselves to, and so possibly infect, fleeces which had till then been sound. The same will happen when wool is washed unsorted; as the wool leaves the washbowls fragments of clot are caught up, and are once more fixed to the wool in the process of drying. Thus the danger-signal becomes obscured, while the risk of infection, though somewhat lessened, still remains a very real one.

What happens in a wool-combing establishment can happen elsewhere whenever infected wool is steeped or washed. Not all foreign wools reach this country in their natural state. They may have been treated in one of two ways: (1) Some wools, notably many East Indian wools, have been washed—i.e., either tub-washed or river-washed in the country of origin. If the washing be done in running water contamination of healthy fleeces will be much less likely to take place than when the wool is tub-washed. Some of the more dangerous material (mohair) is imported from the Cape, and this fact has recently been commented upon in the Cape Parliament. Whatever steps to lessen the evil may in the future be taken there, it is to be hoped that washing of the material will not be resorted to. (2) The wool may be of the kind termed "skin-wool"—i.e., wool obtained from the hides. In so far as the fellmonger's process is a wet one will the objections mentioned hold good: the traces of blood become obliterated, and the virus becomes diffused. Such is the case with East Indian skin-wool, and with skin-mohairs. But not all skin-wools are of this kind. I find that a dry process is in vogue in Persia. Hence in Persian skin-wools the clots are large, heavy, and readily detected, while in East Indian skin-wool and skin-mohair the stains are faint. In Persian skin-wool, therefore, the presence of blood-clots may fairly be taken as an indication of possible danger, while their absence in the others cannot be taken to promise safety. I can see no other explanation for the fact that I have hitherto failed to cultivate anthrax bacilli from Persian wool other than blood-stained, whereas I obtained them in nearly 20 per cent. of a series of samples of East Indian wool, of which samples only two were blood stained.

Here I may be permitted to digress. It is stated that in the case of China horsehair anthrax bacilli may be cultivated with ease from the dust of most samples, and that hair matted with clots is not often found. As mane-hair is shown to be more dangerous than tail-hair, it has been suggested, in explanation, that the long manes of the horses sweep the ground as the animals are grazing, and pick up the spores with the dust. I have recently been afforded the opportunity of examining eight small samples of dust shaken from bundles of Chinese horsehair; in six of them I found evidence, both chemical and spectroscopic, of the presence of blood, and from four out of these six I succeeded in cultivating anthrax bacilli.

River-washed wools, then, and skin-wools obtained by wet methods, have this in common, that traces of blood are obliterated and that anthrax spores are liberated; but there is this difference: Washing is a short process, many spores pass into the stream, and the wool is quickly dried; the hides, on the other hand, are steeped for twenty-four hours in tanks, where every condition is favourable to the multiplication of the germs. Skin-wool so obtained may therefore be more dangerous than river-washed material.

Here, then, lies the difficulty in the administrative control of anthrax, so far as the wool industry is concerned. In the case of material which has not come in contact with water, and which is of sufficiently good quality to repay the cost of looking over or of sorting, the systematic search for blood-clots appears to me to be indicated. So large a quantity of scheduled material is manipulated daily—some firms will deal in a single day with fifty bales and more, each weighing 3 cwt.—that it is very desirable to reduce as far as possible the bulk of the material requiring special treatment. The detection of blood in wool and hair is easy if the material be white or of a light shade of yellow. Greater experience is required to discern it on naturally coloured wools. Here the sense of touch should prove a safe guide. Dried blood imparts a peculiar harsh touch to the fingers, unlike other substances, such as tar, salve, and excrement, from which the eye alone might find difficulty in distinguishing it. It is remarkable how little risk seems to be run by those who handle blood-stained pieces *knowing the danger*. I can recall no case of anthrax among those who have been most successful in recognizing them. The amount of blood-stained material found is often considerable. I know of a firm which has in eighteen months put aside 2,000 lb. of such. To destroy it might entail a considerable loss, and a commission comber would be particularly loth to put away material the property of another. What is to be done with it? and what can be done to render innocuous wool and hair which may show no outward indication of being dangerous?

The Anthrax Board has made many series of experiments to find some method of disinfection which will ensure the destruction of anthrax spores, which will do so without damaging the wool-fibre, and which shall be commercially possible.

Ordinary press-packed wool is, when in the bale, not amenable to disinfection. The unopened fleece, too, is not very permeable. Chemical disinfectants, such as formaldehyde, cyllin, or kerol, do not penetrate blood-clots in reasonable time, for they harden the outer portions. Much was hoped for from Seymour-Jones's method. Dr. Ponder had reported very favourably upon its power of penetrating artificially infected clots. The solution consists of formic acid and corrosive sublimate; the acid enters the clot in advance of the salt and facilitates penetration by its action upon albumens. But in actual practice the method fails, as the lime and other earthy salts present among the wool quickly neutralize the acid. The same disability attaches to Professor Schattenfroh's method, which consists of an 8 per cent. solution of common salt in 1 per cent. hydrochloric acid. This solution will certainly kill anthrax spores in twelve to twenty-four hours; but so sensitive is the mixture that the use of tap-water in place of distilled water renders it inert. The method is obviously inapplicable. Though formaldehyde (1 in 20), cyllin (2 per cent.), and kerol (2 per cent.) find too great an obstacle in clots, they are of use when the spores are unprotected, as in the case in washed wools, and in skin-wools and hair prepared by the wet method.

Considerable attention has, of course, been paid by us to steam disinfection. In order that the results of the tests might be strictly comparable, we used infected mohair clots only, the clots in Persian wools being generally larger and more dense; and as all the clots were obtained from the same bale, it is reasonable to assume that the vitality of the spores in the various clots was approximately the same. In one series of tests a current of live steam was used. A tank, through the bottom of which the steam was allowed to enter, was packed loosely, but as uniformly as possible, with thirty or forty Persian fleeces. An infected clot was wrapped up in a fleece and deposited in the centre of the pile. Fifteen minutes' exposure to the steam sufficed to sterilize the clot. Tests on somewhat similar lines were also carried out with mohair in a loose state, with like results, so long as the steam had free access. A series of experiments was also made with a Defries's "Equifex" Disinfector, the steam being under a pressure of 5 lb., with a temperature of 232° F., and the time of exposure varying from ten to forty-five minutes. Clots packed in single fleeces were easily disinfected in fifteen minutes. When the infected fleece was packed between eighteen or nineteen others, disinfection was generally accomplished in fifteen to thirty minutes; but a slight addition to the impediments to be overcome—such as turning in the ends of the fleece containing the infected clot, or the presence of several hard water-damaged fleeces among the pile—would prevent complete sterilization. On one occasion anthrax bacilli could still be cultivated, though very sparingly, after forty-five minutes' exposure.

The results have thus been inconstant. Had the heavier and harder Persian clots been used the results would, in all probability, have been still less satisfactory. The effect on the raw material would alone condemn this method. The lustre of mohair is diminished; white wool and mohair are turned yellow, and though the average strength of individual fibres is not materially affected, their elasticity is greatly impaired. The material also becomes more harsh, and on being combed produces more noil than does a control sample. In other words, the loss inflicted is a double one; not only is the quality affected but there is also a loss on the combing and a greater amount of waste. Though disinfection by steam is not practicable in bulk, there is no reason why it should not be used for the sterilization of blood-clots removed in the sorting; their daily quantity is small, little time is taken up by the process, and the amount of blood-stained wool so treated would be relatively so small that when sterilized it could be mixed once more with the rest of the wool without affecting the combing or spinning qualities of the whole.

Steam disinfection, particularly when steam under pressure is made use of, has one other drawback: blood-clots become still more firmly fixed and the blood pigment undergoes changes, probably in the direction of hæmatoporphyrin, which make its removal very difficult. In the case of the darker, naturally coloured wools this difficulty may not matter greatly, but in that of white wools it would be a very disturbing element. As time is of no great moment when clots alone are to be treated, it may prove worth while to steep these in warm water over night. They will be softened partly by the water itself and partly by the action of the numerous liquefying bacteria which abound in all wools. When softened in this way the clots must not be steamed, else the wool is rendered quite useless; but disinfectants will now penetrate easily and do not appear so readily to harden the albumen of these clots.

When the time is ripe for the much-needed revision of the wool-sorting and combing regulations many of the alterations will no doubt be based upon the knowledge and experience gained by the Anthrax Board during the last six years. But there is one reform the necessity for which must be obvious to anyone with an observing eye and an open mind who visits these factories. Many workers have at present to handle the wool to a quite unnecessary extent. There is the wash-bowl-feeder, stooping down over the pile of wool at his feet as he is about to lift it on to the feeding-lattice with his face nearly buried in the wool, and there is the card-feeder exposing himself to risk in a similar way. I have seen men enter the chamber into which the willeyed wool has been blown and gathering up armfuls of the wool, throw it into large sheets nearly on a level with their mouths—their head, face, and neck becoming covered with wisps of wool in the process. Surely it cannot transcend the ingenuity of man to devise some method of mechanical convection from one machine to another.

For well-nigh forty years has this problem, the prevention of industrial anthrax, exercised us in Bradford. No one can say that it is satisfactorily solved to-day. But when the solution that has eluded us so long shall at length have been found, it will have been not the work of one man, but the result of the co-operation of the experts in the trade.

DISCUSSION.

The PRESIDENT (Dr. W. H. Hamer) said the Section would wish to thank Dr. Eurich for a very interesting paper; he had helped those who did not know the conditions under which wool was manipulated in Bradford to understand more fully why it was that the ravages of anthrax there were of a different nature from those observed in other cities. In the days when there were no medical inspectors at the Home Office it fell to the lot of the medical officers of the London County Council to make investigations with regard to anthrax, and many years ago he collected the records of 119 cases of the disease which had occurred in London. He had been comparing the sites of pustulation in those cases with the sites in the cases observed by Dr. Eurich. The sites in external anthrax corresponded closely in the two sets of cases; but in the internal form of the disease there was a difference in the percentages, for whereas the author had nineteen internal cases out of 110, in the London series there were only two such out of 119. He had always wondered how it was there was such a difference between the two cities in that respect, but the lantern slides now shown enabled one to see and appreciate more fully the reason; the infected material was dealt with in a different way. He always felt depressed when he heard papers on anthrax, because it seemed to him extraordinary that a piece of preventive medicine work which should be so simple of accomplishment had never yet been satisfactorily carried out. Dr. Eurich had clearly shown that the mischief was wrought by a comparatively small quantity of material, and that had been the experience of all who had worked at the subject of anthrax. Dr. Russell, when he investigated the outbreak in a horsehair factory in Glasgow, pointed out that it was a small quantity of material which was dangerous in this respect, and the same point was made when Dr. Spear, for the Local Government Board, investigated a series of cases which occurred from manipulating China hides in Bermondsey in the eighties. A number of cases occurred in London in the nineties, due to the manipulation of goat-skins from a particular source. Bearing these facts in mind, it seemed extraordinary that nothing more effective in the way of prevention of the disease should yet have been accomplished. M. Chauveau read a paper before the Seventh International Congress of Hygiene in 1891, in which he pointed this fact out, and he argued that it was only by convincing those concerned with the disposal of raw material to which suspicion attached, that to destroy it was the only course open to them in order to safeguard their own interests, that it would be possible to exercise an efficacious check upon the disease. He (Dr. Hamer) thought members might well take that expression of opinion to heart, and he hoped that papers like the present one might have the effect of influencing opinion in this connexion.

Dr. T. M. LEGGE said he also felt grateful to Dr. Eurich for the practical nature of his paper, and for the helpful suggestions he had made for the inevitable revision of the Home Office Regulations to which he had alluded. He agreed with the President that it seemed extraordinary that a disease which caused only sixty or seventy cases per year in factories and docks, of which about fifteen were fatal, should cause so much anxiety, and should in Bradford be considered as a scourge. But he thought there seemed to be in the anthrax bacillus something almost occult. For instance, it was extraordinary that pulmonary anthrax should practically be limited to the wool industry. He did not agree that it was due to the different nature of the processes; there was the same amount of dust in a hide-skin warehouse in Tooley Street as in a Bradford sorting house. Dr. Russell's classical cases in Glasgow in 1878 were cases of internal anthrax from horsehair, but since then he could not recall more than one or two cases of pulmonary anthrax in horsehair workers in this country, though there had been cases abroad. It was not that such cases were not being looked for, because at Guy's Hospital a case of internal anthrax would not be overlooked. The work of the Anthrax Investigation Board was one of the most signal things in industrial progress in this country. That a body of manufacturers should band themselves together, as they had done in Bradford, to try and get rid of the evil, was a most praiseworthy thing, and it was the kind of effort which he would like to see adopted in other districts, so as to minimize the incidence of industrial diseases. In Bradford the determination had been to work on scientific lines. He was present at the first meeting of the Board, and since then the work they had done had quite changed current views about the spread of anthrax.

Dr. Eurich had alluded to the importance of the blood-clot, and the conception of that as the great danger, and hence the need for its removal. This was found to be a much greater danger than the dust. Dr. Eurich's work in the examination of a great many samples of dust from the worsted factories, from which he rarely cultivated anthrax, caused him to turn his attention to the examination of the clots, and in some of them he found from 10 to 20 per cent. infected. A thing which had puzzled him was the following: Seeing that it was the workers' fingers which always came into contact with the wool, it was astonishing that he should have had only one report of a case in which the finger was affected. Did Dr. Eurich think the explanation lay in the frequent washing of the hands? Or was it because there were no hair-follicles on the palms of the hands, and therefore no chance of spores lodging there? Further, did Dr. Eurich think that if a spore lodged in a hair-follicle, or a sweat-gland, and worked its way down a little, a pustule might develop without an abrasion at the site? His own view had been that an abrasion was a necessary condition precedent to such development. Reference was made in the paper to Sclavo's serum, and he would like to hear whether the author had information as to other serums. Sobernheim's serum he knew was being used for treatment in Germany; it was a serum from sheep, whereas Sclavo's was from the ass. The dose of the German preparation was much less than Sclavo's. He had read of a serum being used on a large scale in the Argentine Republic, and the dose of that was even smaller than that of Sobernheim's. Dr. Eurich stated that if an operative who was infected refused the serum, he should be offered a vaccine. Had the author thought of the idea of using the serum as a prophylactic inoculation? Perhaps a much smaller dose than for treatment would suffice for this. This suggests itself in the case of the workers at the factories known to be handling specially dangerous wools. Possibly the operatives might express their dislike of this, but if it were very carefully and tactfully explained to them, their objections could be overcome, just as Dr. Eurich had taught them to give a proper danger value to the blood-clots, a matter which five years ago would not have been thought of. He knew that such prophylactic inoculation had been done, certainly once, in India. Dr. Lingard, in a severe outbreak in a jail in which prisoners were manipulating wool, had nine cases of what he called "anthracæmia," probably meaning pulmonary or erysipelatous anthrax, because he differentiated those cases from malignant pustule. After there had been three fatal cases he used a serum which he prepared for animals in his own laboratory. Of the nine cases which he commenced to treat in that way five recovered, four died, and in the latter the life was a good deal prolonged by the treatment. The important point was that there were sixty men who had to clean out and disinfect the wool-sheds subsequent to the outbreak, in which work, of course, they ran great peril. As a prophylactic, Lingard inoculated 5 c.c. of his serum into each worker, and one case only suffered from anthrax, and that only in mild degree. There seemed to be possibilities for good in it. In conversation, Professor Sclavo agreed that prophylactic inoculation might serve the purpose. What Dr. Eurich said, and what had been generally noticed, on the question of dust, made one think the question had been somewhat neglected. Exact dust determinations had recently been made for the Home Office, stating the results as milligrammes per 10 c.m. of air, by Mr. Duckering, H.M. Inspector of Factories at Birmingham, who had had much experience in the metal-grinding, painting, and pottery industries. He had informed him (the results had not yet been published) that the amount of dust in wool warehouses was much greater than in any of the factories in the industries he had previously inquired into. And it was surprising how much vegetable matter, as well as mineral matter, there was in the wools. But the mineral matter in wool factories, when examined microscopically, was found not to consist of spicular and angular fragments, but of more or less rounded particles, thus presenting a contrast to metal-grinding dust. And so far as he was aware, the workers in wool factories did not complain particularly of affections of the lungs.

Dr. COLLIS said he did not pretend to much knowledge on anthrax, for all the time which was at the disposal of the Department had been devoted by Dr. Legge to the anthrax question. That the disease was of interest to others besides those concerned with occupation disorders was once brought home vividly to him. A friend of his, whose father was connected with the horse-hair trade, and who was therefore familiar with the appearance of an anthrax pustule, was dressing for a surgeon at hospital when a man came with a curious sore on the face, and the surgeon sent him to the house surgeon in the next room to excise it. But the dresser thought that, notwithstanding the black centre, it did not look quite like an anthrax sore, so he slipped back and made one or two inquiries of the patient, who proved to be the father of a baby who had recently been vaccinated, and the operation was successfully abandoned. He had thoroughly enjoyed hearing the paper and seeing the instructive photographs.

Dr. CROOKSHANK asked whether much was known about anthrax as it occurred in its natural state amongst animals in South Africa and South America and other countries. He noticed that most of the workers shown in the photographs were obviously men in the habit of shaving, and wondered whether the liability to inflict cuts on themselves when shaving increased the risk of getting the disease.

Mr. MAJOR GREENWOOD, jun., said he was interested in the question of cutaneous irritation precedent to contracting the disease. Dr. Legge raised the question as to the possibility of infection through the unbroken skin. Was there a different degree of irritation in the various phases of the process of manufacture, and, if so, did such difference have any relation to the case-rate.

Dr. EURICH, in reply, said, with regard to the comparison of the internal cases of the disease at Bradford with those occurring elsewhere, it was a question whether the difference was due to these internal cases not having been recognized elsewhere. In tanneries, for instance, one could understand pulmonary cases being rare, because hides were dealt with in the wet state, and there was not much dust. In the felt industry in Lancashire, during the last eight or nine years there had been twenty-one or twenty-two cases of anthrax, and, in spite of the fact that much more dust was associated with the felt industry, not one case of internal anthrax had been reported in connexion with that industry. That industry also dealt in East India wool, and he did not know why Bradford and district should have internal cases of anthrax while the felt industry had none. He agreed as to the rarity of anthrax pustules on the fingers; he had seen it there only twice, which was a very small proportion of the total number of cases. His view was that scratches and pimples did not play such an important part in the development of anthrax as his predecessors believed. Anthrax had been experimentally produced by rubbing infected material on to the skin; and he had been struck by the frequency with which the site attacked proved to be a surface where friction operated, such as where the hat fitted on the forehead, the neck, and the wrist. But those were also common sites of pimples. Still, one or two cases were traceable to injury. One case was traceable to a prick from a thorn in the wool; in another case the man pricked his wrist with a "faller," one of the sharp needles of a preparing machine, and anthrax developed twenty-four hours later. Of course, shaving the face might increase the liability to infection, but it was difficult to determine that, as there were so few bearded men doing the work. Possibly one or two of the pustules on the lips which he had seen were due to the shaving. Still, one occurred in a man who wore a moustache. He had at home some samples of Sobernheim's serum, but he had had good results with Sclavo's serum, so good that he hesitated to try a fresh kind. For immunization purposes the number of people who would have to be inoculated was large, and the immunity so produced would be but short-lived. He could understand it doing good in the jail mentioned by Dr. Legge, where the dangerous work would probably not last long. But in the Bradford industry the work was continuous, and one never knew when an infected bale would be opened. Seeing how often the serum would have to be administered, there was a danger of anaphylaxis occurring. To prevent anaphylaxis the only safe plan would seem to be to alternate the two sera. As a prophylactic, probably the efficacy of the serum would be greater when combined with a vaccine. Still, he questioned whether the worker would submit to it. The classification of these diseases, or many of them, in foreign countries was very unsatisfactory. He had derived the impression from reading, and the same was said by Dr. Bell, that many diseases which were called anthrax were not that condition; while, e.g., many cases called plague were probably anthrax. Also, the veterinary inspection in those countries was by no means ideal. Still, it was to be hoped that our

Consular bodies would be interested in the question, and send home regular reports. He was much interested in Dr. Collis's speech, and the mistaking of a vaccination pustule for one due to anthrax. The same thing had happened to himself; he was called in to see a woman who had a pustule on the chin. She did not work in a wool factory, but her doctor thought she had been infected from having worn another woman's shawl. He (Dr. Eurich) asked how the baby was, and learned it was recently vaccinated. There was no anthrax in the pustule. Careful inquiry should be made into the duration of the pustule. The fifth day of an anthrax pustule looked like the pustule of vaccination at the ninth or tenth day. Workers in scheduled materials had instructions to inform the foreman as soon as there was the appearance of a pustule, or a prick, but many were very careless about themselves. At all these factories there were means and facilities for dressing wounds. In some cases the sufferers had neglected the foreman's recommendation to seek medical advice. Here, as elsewhere, familiarity too often breeds contempt.

PROCEEDINGS

OF THE

ROYAL SOCIETY OF MEDICINE

VOLUME THE SIXTH

COMPRISING THE REPORT OF THE PROCEEDINGS FOR THE
SESSION 1912-13

SECTION OF THE HISTORY OF MEDICINE

LONDON
LONGMANS, GREEN & CO., PATERNOSTER ROW
1913

Section of the History of Medicine.

OFFICERS FOR THE SESSION 1912-13.

President—

Sir William Osler, Bt., M.D., F.R.S.

Vice-Presidents—

Sir T. Clifford Allbutt, K.C.B., M.D., F.R.S.
Richard Caton, M.D.
Henry Barnes, M.D.
Sir William S. Church, Bt., K.C.B., M.D.
Sir Henry Morris, Bt., F.R.C.S.
Sir Ronald Ross, K.C.B., F.R.S.

Hon. Secretaries—

Raymond Crawfurd, M.D.
D'Arcy Power, F.R.C.S.

Other Members of Council—

Dudley W. Buxton, M.D.
F. W. Cock, M.D.
J. D. Comrie, M.D.
Alban Doran, F.R.C.S.
David Forsyth, M.D.
James Galloway, M.D.
Leonard G. Guthrie, M.D.
E. Muirhead Little, F.R.C.S.
R. O. Moon, M.D.
Sir Shirley F. Murphy, F.R.C.S.
J. A. Nixon, M.B.
George C. Peachey.
Herbert S. Pendlebury, F.R.C.S.
H. D. Rolleston, M.D.
F. M. Sandwith, M.D.
A. F. Voelcker, M.D.

Representative on Library Committee—

Raymond Crawfurd, M.D.

Representative on Editorial Committee—

D'Arcy Power, F.R.C.S.

SECTION OF THE HISTORY OF MEDICINE.

CONTENTS.

November 20, 1912.

PAGE

By Sir William Osler, Bt., M.D., F.R.S.

(1) President's Opening Remarks 1

(2) A Down Survey Manuscript of William Petty 2

Contributions from the History of Medicine to the Problem of the Transmission of Typhus. By Raymond Crawfurd, M.D. 6

Notes on Early Portraits of John Banister, of William Harvey, and the Barber-Surgeons' Visceral Lecture in 1581. By D'Arcy Power, F.R.C.S. ... 18

January 29, 1913.

Plague Banners. By Raymond Crawfurd, M.D. 37

Some Oddities in Nomenclature. By B. Glanvill Corney, I.S.O. 48

Portrait of Humphrie Lloyd 53

A Demonstration of some Eighteenth Century Obstetric Forceps. By Alban Doran, F.R.C.S. 54

Medical Allusions in the Writings of Francis Bacon. By G. W. Steeves, M.D. 76

March 5, 1913.

By Joseph Offord.

(1) A New Egyptian Medical Papyrus 97

(2) Restrictions concerning Circumcision under the Romans 102

Old English Herbals, 1525-1640. By H. M. Barlow 108

The Lady Sedley's Receipt Book, 1686, and other Seventeenth Century Receipt Books. By Leonard Guthrie, M.D. 150

Examples of Old Drug-pots. By J. D. Marshall 171

May 28, 1913.

PAGE
A Short Review of the History of Ancient Hindu Medicine. By C. MUTHU, M.D. ... 177
The Hospital and Chapel of Saint Mary Ronceval at Charing Cross. By JAMES GALLOWAY, M.D. 191
Further Notes on Thomas Dover. By J. A. NIXON, M.B. 233
By MACLEOD YEARSLEY, F.R.C.S.
(1) Formulæ Medicamentorum Concinnatæ 237
(2) John Avery (1807-1855) 240

The Council think it right to state that the Society does not hold itself in any way responsible for the statements made or the views put forward in the various papers.

JOHN BALE, SONS & DANIELSSON, LTD., 83-91, Great Titchfield Street, London, W.

Section of the History of Medicine.

November 20, 1912.

Sir Wm. Osler, Bt., F.R.S., President of the Section, in the Chair.

President's Introductory Remarks.

In thanking the members of the Section for the honour of election as their first Chairman, Sir William Osler remarked that he had at least two qualifications—a keen interest in the subject, and a certain academic leisure, which would enable him to attend to the duties of the position. Physicians held very different views on the subject of the history of medicine. A majority were indifferent—too busy to pay any attention to it; a considerable number were interested enough to read articles, or to listen to papers; then there were the amateur students, like himself, who dabbled in history as a pastime; and, lastly, there was a select group of real scholars, men like Adams, Greenhill and Payne. It was to be hoped that this Section would form a meeting ground for the scholars, the students, and for all those who felt that the study of the history of medicine had a value in education.

He felt sure, from the number of men who had sent in their names, that it would prove to be a useful working section. There was much to be done, for example, in British medicine in continuation of the good work of Payne, Norman Moore and D'Arcy Power. The Section might encourage educational work, and it would be easy to arrange courses of lectures by experts in Egyptian, Babylonian, Greek and Roman medicine, which would prove very attractive to senior students, and to young practitioners. At each meeting demonstrations of books, &c., could be arranged to illustrate some special phase in the evolution of medicine.

He would ask the members of the Section to take a special interest in the Library of the Society. Though large, and rapidly growing, there were many lacunæ, particularly in the choice editions of the works of the great masters of the profession, and he would suggest that by special subscriptions among the members and Fellows, as occasion offered, such books should be bought.

And, lastly, the members were reminded of the Historical Section of the International Medical Congress next year, and urged to help to make it a great success.

A Down Survey Manuscript of William Petty.

Note by Sir WILLIAM OSLER, Bt., M.D., F.R.S.

SIR WILLIAM PETTY (born 1623, died 1687), for a short time Professor of Anatomy in the University of Oxford and Vice-Principal of Brasenose College, has outlived the somewhat slender reputation he had in the profession; and yet in one particular he deserves to be held in remembrance among us for his share in Graunt's "Bills of Mortality of the City of London," 1661, the first work of the kind in English, and for his "Observations on the Dublin Bills of Mortality," 1683. As a political economist his praise is in the schools. In the "Treatise on Taxes and Contributions" (1662), the "Discourse on Political Arithmetic" (1691), the "Political Anatomy of Ireland," and in certain minor tracts, students find the beginnings of that science in these islands. Before Petty no one had tried accurately to estimate the money value of the individual life to the nation, the importance of the division of labour, and the real nature of wealth. Let me quote one sentence from "Verbum Sapienti" (from the 1691 edition, p. 14):—

> "For Money is but the Fat of the Body-Politick, whereof too much doth as often hinder its Agility, as too little makes it sick. 'Tis true, that as Fat lubricates the motion of the Muscles, feeds in want of Victuals, fills up uneven cavities, and beautifies the Body; so doth Money in the State quicken its Action, feeds from abroad in time of Dearth at home: evens accounts by reason of its divisibility, and beautifies the whole, altho more particularly the particular persons who have it in plenty."

You will not wonder that the Cambridge University Press reprinted his economic works, 1899 (edited by C. H. Hull) when you hear the following extract from Lord Edmond Fitzmaurice's "Life," 1895:—

> "In the 'Treatise on Taxes,' with an eye still fixed in the same direction, he begins by pointing out that the only legitimate public charges of the State

are, its defence by land and sea so as to secure peace at home and abroad, and honourable vindication from injury by foreign nations; the maintenance of the chief of the State in becoming splendour, and of the administration, in all its branches, in a state of efficiency; 'the pastorage of souls by salaried ministers of religion'; the charge of schools and universities, the endowment of which, in his opinion, ought to be a concern of the State, and the distribution of whose emoluments ought not to be 'according to the fond conceits of parents and friends,' and of which one of the principal aims should be the discovery of Nature in all its operations; 'the maintenance of orphans, the aged, and the impotent,' for, in his opinion, 'the poor can lay up nothing against the time of their impotency and want of work, when we think it is just to limit the wages of the poor'; and the improvements of roads, navigable rivers, bridges, harbours, and the means of communication, and the development of mines and collieries."

But Petty has a third claim to remembrance as the author of the famous Down Survey of Ireland—which "stands to-day, with the accompanying books of distribution, the legal record of the title on which half the land of Ireland is held" (Larcom). The text of my few remarks is an interesting manuscript relating to this work which chance threw in my way. In 1649 Petty had been named Deputy to Dr. Clayton, the then Regius Professor of Medicine at Oxford, and in 1651 succeeded him in the Chair of Anatomy. At Oxford he became an active member of the Club or Society, out of which originated the Royal Society. In 1652 he was appointed Physician-General to the Forces in Ireland, with which country the remainder of a stormy life was to be associated. A masterful, energetic, resourceful man, the first thing he did was to reorganize the Medical service. Energy in action was, he said, the great requisite of life, and soon an opportunity offered which called forth all his powers. In 1652 the Irish were conquered—the English won, and as Petty says, "had amongst other pretences a Gamester's right at least to their estates." The claimants were (1): The adventurers in England to whom 2,500,000 acres of Irish land had been pledged for money advanced to raise an army; (2) the soldiers of the New Model Army of Cromwell and Fairfax, who had really done the fighting; and (3) the Commonwealth, which had reserved the Crown and Church, and certain other lands. There were, it is said, 35,000 claimants of land in all. Lots were drawn, and attempts were made at the distribution, but it was found impossible to identify the lot drawn with any particular parcel of land. There was no survey, and matters were soon in a hopeless muddle. The Surveyor-General, also a doctor, a visionary, unpractical man, insisted that a survey could not be made in less than thirteen years. Petty, a strong critic of this scheme, undertook to finish the job in thirteen months, if given a free hand. Registers and valuation lists existed in places, but no maps; Petty agreed "to survey, admeasure and to map," and so his work came to be known as the "Down" survey, because it was surveyed *down* on a map. The date fixed was February 1, 1655, and the rate of payment agreed upon was £7 3s. 4d. per 1,000 acres of forfeited profitable land, and the Church and Crown Lands at £3 per acre. It was a vast undertaking, but Petty had a genius for organization, and was himself a practical surveyor as well as a mathematician and physicist of the first rank. We get a glimpse of the way he went to work from a contemporary account:—

> "The said Petty, consideringe the vastnesse of the worke, thought of dividinge both the art of makeinge instruments, as alsoe that of usinge them into many partes, viz., the one man made only measuringe chaines, vizt. a wire maker; another magneticall needles, with theire pins, vizt. a watchmaker; another turned the boxes out of wood, and the heads of the stands on which the instrument playes, vizt., a turnor; another the stands, or leggs, a pipe maker; another all the brasse worke, vizt., a founder; another workman, of a more versatile head and hand, touches the needles, adjusts the sights and cards, and adaptates every peece to each other."

In the meantime scales, protractors and compass cards were prepared by the ablest artists in London, whither also were sent for, to use the old expression, "a magazine of royal paper, mouth-glue, colours, pencils," &c. Field books were prepared, and the ablest men in each barony and parish were selected as helpers. A staff of 1,000 persons was organized with forty clerks at headquarters and an army of surveyors and under-measurers. By April, 1656, the greater part of the special work assigned was finished, and he had surveyed for the army about 3½ millions of acres. Subsequently he undertook the survey of the adventurers' lands, a task which occupied his time until nearly the end of 1658.

As Sir Thomas Larcom, the historian of the survey, remarks:—

> "It is difficult to imagine a work more of obscurity and uncertainty than to locate 32 thousand officers, soldiers and followers with adventurers, settlers of every kind and class, having different and uncertain claims, on lands of different and uncertain value, in detached parcels sprinkled over two-thirds of the surface of Ireland."

But this is the task Dr. Petty successfully accomplished. The MS. which I show deals with the survey and was bound at the back of two volumes of Petty's letters, which I bought at the sale of the Phillips MSS.

in April, 1911. The numerous manuscripts relating to the survey are in the possession of the Lansdowne family (descendants of Petty) in the British Museum, and in the Public Record Office in Dublin. This manuscript has two points of interest: A copy, in Petty's hand, of the contract, dated Dublin, May 18, 1655, signed by Charles Fleetwood on behalf of the Council of Officers. This has already been published in Larcom's book. But the greater portion of the MS. is occupied with private memoranda concerning the detailed cost of the work of the survey. These, I am informed by Mr. Mills, of the Public Record Office, Dublin, "have not been known to Sir Thos. Larcom, Hardinge, or Lord Fitzmaurice, when writing on Petty's work. They should be of interest to any future writer on Petty's life or his great work."

In reading Petty's life and works, one gets the impression of a man born out of due time. His ideas, and the practical capacity and energy with which he carried them into execution, suggest the twentieth rather than the seventeenth century. No one of his writings shows the man in a better light than a little tractate on education, "Advice of W. P. to Samuel Hartlib for the Advancement of some particular Parts of Learning" (London, 1648). He suggests the establishment of "ergastula literaria," literature workshops where children may be taught to do something towards their living as well as to read and to write; and he would have all children, though of the highest rank, do "some gentile manufacture in their minority." He also urged the establishment of a college of tradesmen—a technical school, "Gymnasium Mechanicum"—"to which one prime and ingenious workman of each trade should be appointed a Fellow."

Of special interest is his advocacy of a "Nosocomium Academicum," or a hospital to cure the infirmities both of physicians and patients. It is the first suggestion I know of a research hospital. And he lastly urges the formation of a society, which will be "as careful to advance Arts as the Jesuits are to propagate their Religion"—which indicates that he had in mind at that time the organization of the Royal Society.

Pepys, in the celebrated "Diary," has many notices of Petty, who, he says, "In discourse is methinks one of the most rational men that ever I heard speak with a tongue, having all his opinions most distinct and clear"—a judgment amply confirmed by all those who have studied the writings of this remarkable man.

Contributions from the History of Medicine to the Problem of the Transmission of Typhus.

By RAYMOND CRAWFURD, M.D.

IT is, of course, a matter of general knowledge that the flea is one important agent in the conveyance of the bacillus of plague to man, but it is less generally known that both French and American experimenters have succeeded in communicating typhus from man to certain animals by the agency of the body-louse (*Pediculus corporis* or *Pediculus vestimentorum*). We may reasonably infer from the acute self-limited course of the fever, and from the almost complete immunity conferred by an attack, that typhus also, like plague, is caused by a specific micro-organism, and perhaps this parallelism with plague in the mode of communication may be regarded as corroborative evidence of this inference. As the conditions favourable to the multiplication and activity of the flea and the body-louse are in most respects identical, one would expect to find a high degree of similarity in the epidemicity of the two diseases, in any region in which both diseases are known to occur; and conversely any differences of habits of life of the two parasites should be reflected in differences of epidemic prevalence. We will endeavour to see to what extent the history of medicine confirms these two propositions.

There is scarcely a single writer of the sixteenth, seventeenth, or eighteenth centuries on the subject of fevers who has not commented on the concurrence of malignant fevers with epidemics of plague. It is true that they do not all identify the malignant fevers as typhus, simply because the identity of typhus, though established by Fracastorius as early as 1546, did not become generally recognized throughout Europe until the eighteenth century, and even then its identity was obscured under a multiplicity of synonyms. Short, writing in the first half of the eighteenth century, commented on the great affinity between plague and spotted fever, then the general name of typhus, and gave a list of eighteen recent epidemics, in which one had turned into the other. Mead also had laid it down that "Fevers of extraordinary malignity are the usual forerunners of plague," and Hancock, in 1821, asserted that nearly all the most remarkable plagues of the last two centuries had been preceded by typhus. He might have added relapsing fever as well, for there was seldom an epidemic of typhus without a simultaneous outbreak of relapsing fever. We have recently obtained the explanation of this close association of typhus and relapsing fevers in the successful transmission of relapsing fever, also by the agency of body-lice.

Bearing in mind this close and constant association of acute infectious fevers, it is easy to understand how it came about that medical men conceived that all fevers were essentially the same, differing from one another not in kind, but only in degree. Lord Bacon had observed the association, for he wrote, "the lesser infections of small-pox, purple fever [typhus], agues, &c., in the preceding summer, and hovering all winter, do portend a great pestilence the summer following. For putrefaction rises not to its height at once." But these are mere general statements, and we need to examine the specific occurrences upon which they are based. These are so numerous that it is only possible to cite the most important. Villani, in his "History of Florence," says that a sort of sickness, which always follows famine, fell on the poor of Florence the year before the Black Death. Ambroise Paré, in 1568, described a pestilential fever as prevailing in France along with true plague, in which the skin was marked with spots like the bites of fleas or bugs. Vilalba says that on several occasions during the sixteenth century a spotted fever, called tabardiglio, which is now known to have been typhus, prevailed in Spain along with plague, and was much confused with it. Lotz says that in 1624 a malignant spotted fever prevailed in London, which, in 1625, turned to the plague, and in 1626 back again to spotted fever. Similarly Sydenham says that the Great Plague of London was preceded and followed by a pestilent fever, which from the description he gives was clearly typhus, and he remarks that it differed from the plague only in the milder character of its symptoms. Boghurst says that many had spotted fever and plague at the same time, and the Bills of Mortality show a great increase of deaths from fever coincidently with the plague. The records of Lotz and Sydenham are only two of many which testify that typhus was apt to linger on *after* plague disappeared, as well as to *precede* it. According to Diemerbroeck, spotted fever preceded plague in Holland in 1636, and its malignity increased progressively, until finally it became converted into true plague. The plague of Vienna in 1679 was preceded by an epidemic of "Hitzig-Krankheit," which was far too fatal for relapsing fever, and was therefore almost certainly typhus. Mead and other medical writers admit that a fever of extraordinary malignity prevailed in Marseilles, in 1720, before the arrival of the ship that was held to have brought the plague; indeed, the physicians at Leghorn had actually decided that the fever aboard the ship was malignant pestilential fever and not plague. Russell states that the plague of Aleppo, in 1760, was preceded by a malignant petechial fever, which was almost as fatal as the plague; and Mertens says the same of the plague of Moscow in 1771. It is useless to multiply further examples of the almost constant concurrence of typhus and plague in the great epidemics of former centuries. We are now in a position to appreciate how it came about that at the outset of almost every great epidemic of plague acrimonious controversy raged among physicians as to whether the disease were plague or no. And the confusion becomes still more intelligible when we consider the similarity of the general symptoms, and that typhus patients were not infrequently affected with buboes. Murchison found these in as many as 2 per cent of typhus patients in some epidemics. It also gives us pause in accepting without reserve the habitual assertion of present-day physicians, that the manifestations of plague are atypical at the commencement of an epidemic.

Now, are there any circumstances in the life-history of the flea and the louse that will explain the tendency noted by these various writers for typhus to precede plague in its appearance? I think there are. Practically all the epidemics of plague cited above were at their height in the summer months, when the propagation and activity of the flea are at a maximum. Now the body-louse, as it adheres closely to the human body and clothing, is independent of seasonal change in its activity, so long as its habitation is undisturbed. But disturbance of its habitation *does* occur, and chiefly in the summer months, when cleanliness and changes of clothing are at a maximum, whereas in winter these phenomena are apt to follow the thermometer closely in its approximation to zero; and coincidently with this the desire for warmth induces overcrowding, with increased facilities for the transmission of lice from man to man. Logically, then, we should expect the two diseases to concur, but with plague at its maximum in the European summer, and typhus at its maximum in the European winter, and this has actually been the case.

Of the rôle of clothing in the carriage of typhus there is no doubt, for Murchison says that the porters engaged in handling, and the nurses engaged in washing, the clothing and the bedclothes of the patients in the London Fever Hospital were so frequently attacked with typhus that it was next to impossible to get persons to undertake the tasks.

The body-louse clings by preference to the clothing, and only transfers itself to the human body at meal-times.

I would suggest, too, that in cleanliness and change of clothing is to be found the explanation of the fact that typhus is virtually unknown in Tropical Africa. The *Pediculus capitis* and *Pediculus pubis* are common enough in West Africa, but the *Pediculus vestimentorum* is as rare as native clothing is scanty. I am told by an experienced West African doctor that he has never seen *Pediculus vestimentorum* there, except imported on the persons of Syrian traders—eloquent testimony to the fact that man is clean, until he is civilized. On this assumption, too, a fact recorded by Bancroft, Lind, Trotter, Hildenbrand, Jacquot and Murchison becomes explicable, that the naked slaves in infected slave-ships were immune from typhus. It cannot be an instance parallel to the immunity of the Arab from typhoid, for nakedness was a condition of the immunity, which did not extend to those who were clothed. Murchison found from an analysis of 18,268 cases of typhus admitted to the London Fever Hospital in twenty-three successive years, that the largest number were admitted in winter and spring, and the smallest in summer; and also that in a protracted epidemic there was habitually a fall in summer and autumn, followed by an increase on the approach, and especially after the persistence, of cold weather. Converting these facts into terms of our hypothesis, we have it that typhus is most common when cold produces the uncleanliness and overcrowding that favour the activity and dissemination of body-lice.

Of the relation of typhus with overcrowding it is hardly necessary to speak. Murchison located the residence of 26,380 typhus patients in London, and showed beyond all doubt that the incidence of typhus was directly proportional to the degree of overcrowding. No less than 95 per cent. of these were destitute, and had either drifted into workhouses or were dependent on parochial relief. In seventeen years Murchison saw only six typhus patients in his private practice among the well-to-do, and three of these had been brought by reason of their occupations into close and constant contact with the destitute poor. Murchison's experience in this respect was more than confirmed by that of Sir W. Jenner and Dr. Tweedie. Those, then, who were clean and not overcrowded did not become infected. This also suggests a limited mobility of the virus of typhus, which at the same time is intensely virulent at close quarters. Very few of those in immediate contact with the patients, such as the nurses, porters, and resident medical officers, at the London Fever Hospital, escaped an attack of typhus. Other fevers such as measles and scarlet fever tend to arise under the same local conditions of squalor as typhus, but they quickly spread far and wide, independent of these initial influences, whereas typhus remains localized. The relative mobility of the flea and the louse is probably of secondary importance, for the power of locomotion of the louse is commensurate with that of his host, man.

We may pass on now to consider whether the general conditions which our medical predecessors believed to be most favourable for the prevalence of typhus were such as to suggest transmission by the agency of body-lice. Murchison, in his masterly treatise on "Continued Fevers," has classified the various synonyms of typhus fever, the greater number of which were derived from its prevalence in *camps* and *gaols*, and a less number from its prevalence in *ships* and *hospitals*. One physician, Laycock (1861), went a step further and coined the name "ochlotic fever" (ὄχλος = a crowd), to indicate that overcrowding was the common factor underlying its prevalence in these various situations. Let us consider what justification facts afforded for the nomenclature.

First, as to camps and armies: Andreas Gratioli, in 1576, described an epidemic of typhus that devastated the army of Charles V during the Siege of Metz. Forestus, in 1594, recorded an outbreak during the wars in Holland between the Dutch and the Spaniards at the end of the sixteenth century. Sennertus, in 1619, and many others described it as *morbus castrensis* or *morbus Hungaricus*, when it broke out in the army of Maximilian II in Hungary, and spread thence all over Central Europe. Rhumelius, in 1625, spoke of typhus as *morbus qui ex castris in Bavariam penetravit*: this outbreak originated among the confederate troops at Wiedhausen, and spread over the whole of Bavaria. Various writers term it *pestis bellica* or *Typhus bellicus*. Thomas Willis, in 1679, gave the name *febris castrensis* to the typhus that raged during the Civil War in Oxford, where he was studying medicine, and Haller in 1742 followed his lead. Petri, in 1665, used the name *febris militaris*; Brandhurst, in 1746, *febris castrensis petechialis epidemica*; Sauvages, in 1759, *Typhus castrensis*; Grant, in 1775, *camp fever*; Hufeland and Russ, describing the epidemic in Russia and Poland during the campaign of 1806-07, *die Kriegspest*; and Louis, in 1829, *Typhus des camps et des armées*.

Typhus was rampant everywhere in the wake of Napoleon's armies, and notably during the retreat from Moscow, when his soldiers were infested with vermin; but its greatest havoc has been wrought upon beleaguered garrisons. In times of war it has often been epidemic in places in which it did not occur in times of peace. This was the case in the Crimea. The first epidemic of typhus, in the winter of 1854-55, fell chiefly on the English, whose commissariat and lodgment were then far inferior to those of the French; but in the following winter the conditions were reversed and the French suffered most. On the condition of the English troops in the first year of the campaign I am able to supply some valuable and graphic evidence from letters which I have received from two veteran Army medical officers—Sir Anthony Dickson Home, V.C., and Sir R. J. Jackson. The former writes, under date September 23, 1912: "I have not a word to withdraw in my statement that everyone in the *first* year of the Crimean War was infested by an indescribable plague of lice: it was common knowledge in the camp —officers and men — but the epidemic passed off within two or three months, when fresh clothing became available." Sir R. J. Jackson writes, under date September 25, 1912; "Soon after our arrival in the Crimea, Staff-Surgeon W. Maclise, who had been my predecessor in the 90th L.I. — a brother of D. Maclise, the famous painter. W. Maclise had been in the Alma, and when visiting his old corps before Sebastopol, stated that his shirt was so lively with lice that it accompanied him on the march. The men were seriously infested with vermin, and, as water was scarce, I have seen the men ironing their clothing by rolling a 32-lb. shot over the garment placed on a flat stone. I know that some of the officers also suffered. I don't know whether the Russians were similarly affected, but after they were driven out of the Redan I visited some of the casemates, these swarmed with fleas, and I had quite a garrison about me when I returned to camp." Dr. Douglas A. Reid, another veteran, tells me that when he arrived early in February, 1855, the pest had abated so as not to attract notice specially, and he ascribes the abatement to the discarding of the old clothing, when new was issued. All the medical writers—English, French and Russian — express the single opinion, that overcrowding was the exciting cause of the typhus, and that the effects were most disastrous, when the rigour of the Russian winter encouraged further overcrowding, for the sake of warmth. Overcrowding will, of course, facilitate the transference of lice from man to man, but the impracticability of personal cleanliness and of changing or cleaning the underclothing, and the necessary interchange of bedding, must have been factors, in time of active warfare, at least as important as over-crowding. The Black Hole of Calcutta, in 1756, had shown sufficiently that no degree of overcrowding could alone produce typhus, and, conversely, typhus had often fastened on armies in the open air and on the move. During the Egyptian, Sudanese and South African campaigns the troops were abundantly infested with lice, but, in the absence of the hypothetical causative organism, typhus did not, of course, ensue. Given its presence as in the wars of previous centuries, typhus would assuredly have resulted. The importance of these considerations in military hygiene, as indicating the imperative necessity of drastic treatment of lice, can hardly be over-estimated.

Synonyms of typhus indicating its prevalence in gaols are only less numerous than the military synonyms. Huxham, in 1742, termed it *febris contagiosa in carceribus genita*; Pringle, Heysham, and John Howard, *Jayl fever*; Sauvages, *Typhus carcerum*; Burserius, *febris carceraria*; J. G. Smyth, in 1795, *jail distemper*; and many French writers, *maladie des prisons*. All these medical men were agreed that though dirt and destitution were inseparable from typhus, the essential cause was overcrowding, and they vaguely conceived the virus to be generated in the exhalations. This view has crystallized out in a forcible and expressive passage from William Grant's essay on the "Pestilential Fever," published in 1775. "If any person," he says, "will take the trouble to stand in the sun and look at his own shadow on a white-plastered wall, he will easily perceive that his whole body is a smoking dunghill, with a vapour exhaling from every part of it"; and the vapour from this human dunghill Grant conceived to be the efficient virus of typhus.

John Howard, describing, in 1784, the inexpressible filthiness of British prisons, says: "If it were asked what is the cause of gaol fever, it would in general be said, the want of fresh air and cleanliness. But as I have seen in some prisons abroad, cells and dungeons as offensive and dirty as any I have observed in this country, where, however, the distemper was unknown, I am obliged to look out for some *additional cause* for its production." He seems to incline to regard this factor as in some way bound up with overcrowding, but it did not occur to him that it was the presence of infected body-lice.

So frequently did typhus fever originate in the gaols, and spread from them to the population of towns, in which typhus had not been present previously, that medical men were driven to the seemingly not unreasonable conclusion that typhus could be generated *de novo* in dirty, overcrowded prisons. During the nineteenth century epidemics of typhus were frequent in the overcrowded French prisons, and invariably arose within the gaols. In these instances the possibility of importation from without was almost non-existent, for typhus was practically absent from France. But there is no difficulty of understanding its origin, if we assume that there were typhus-infected lice or their ova in the prisons. It must be borne in mind that the same beds and the same prison clothing would be utilized by successive relays of prisoners.

In 1839 there was a severe outbreak of typhus in the gaol at Rheims. Some of the cells were grossly overcrowded, others were not. The fever commenced in and was confined to the overcrowded cells, except for two cases in a part of the gaol that was not overcrowded. There was no typhus in or about Rheims prior to the outbreak in the gaol. I would suggest that the difference between the overcrowded part and the rest of the gaol was *this*, that only in the former part was a temperature of atmosphere reached high enough to hatch out the infected ova of body-lice. That typhus is transferable from the louse to its ovum has been proved by experiment recently.

In 1854 an outbreak of typhus occurred in Strasbourg gaol during a period of overcrowding. There had been no typhus either in the gaol or in the town of Strasbourg since 1814. Adapting the louse theory of transmission to these facts, it is difficult to avoid the conclusion that infected ova had lain dormant for forty years, and become vivified and active under the influence of a suitable temperature. I have been unable to find any reliable evidence on the life-habits of the body-louse by which to test such an audacious hypothesis. The literature of the subject is abundant, but consists chiefly of casual untested statements transferred from book to book. A short report by Warburton to the Local Government Board is a noteworthy exception, but for all that the louse still awaits his biographer. To assume the presence of a typhus carrier—if such a condition were known to exist—would not lessen the difficulty, for he equally must have carried the virus for forty years, and that without previously communicating typhus.

The records of the six so-called Black Assizes, in some of which a disease that closely resembled typhus fever was communicated by the prisoners to many of those in court, including even judges and high sheriffs, are full of epidemiological interest. But before some of these are accepted as outbreaks of typhus fever the evidence requires much more careful sifting than it has received at present.

Typhus has derived several of its synonyms from its aforetime prevalence on ship-board. Huxham, in 1752, designated it *Febris* *pestilentialis nautica;* Lind, in 1763, and Grant, in 1775, *Ship-fever;* Burserias, in 1785, *Febris nautica;* Blane, in 1789, *Infectious Ship-fever.* Outbreaks of typhus on ships were of constant occurrence in the eighteenth century, and the conditions under which they seemed to arise led the best medical opinion to the conclusion that the disease was generated *de novo* aboard ship in conditions of dirt and overcrowding. A few examples out of many given by Murchison and others will indicate sufficiently the grounds on which they came to this conclusion. James Lind recorded an outbreak on a frigate several weeks after it had left the coast of America. Thus there was no possibility of importation in the interval, and the period that elapsed before the outbreak was far too long for incubation of an infection received before landing. Again, in 1810, there was an outbreak among the French prisoners on the prison-ships in Plymouth harbour. There was no typhus in Plymouth, and if there had been the ships were completely isolated. Again, in 1829-30, there was an outbreak on the French convict hulks at Toulon, though there was no typhus in Toulon. The conditions were the same as prevailed at Plymouth. Five other epidemics—in 1820, 1833, 1845, 1855, 1856—occurred in these same convict hulks, always under conditions of overcrowding and uncleanliness. The difficulty in all these cases disappears, if we assume the presence aboard ship of infected lice or their ova. No theory of typhus carriage could well explain the six successive outbreaks at Toulon over a period of thirty-six years.

In 1861 an Egyptian frigate with a crew mostly composed of Arabs imported typhus into Liverpool, infecting the attendants at the public baths as well as twenty-five inmates of the Southern Hospital. Although unspeakable filth and overcrowding prevailed on board not one of the crew had typhus, either on the ship or in Liverpool, though they communicated it to many. We may draw at any rate this useful conclusion from the circumstances—viz., that even if we have established the transmissibility of typhus by lice, there still remain other problems of its epidemiology to be solved.

Occasional spontaneous outbreaks in hospitals served to provide a few other synonyms for typhus. Pringle, in 1752, pointed out that it did arise in hospitals in the absence of typhus from the locality, and termed it *Malignant fever of the hospital;* Burserius, in 1785, named it *Febris nosocomialis;* and several French writers, *Fièvre des hôpitaux.*

Importation into a hospital is difficult to disprove, and it is not without interest that in the case of a recent epidemic of typhus in North

West India, a careful examination of the bedding disclosed the presence of numerous ova of the body-louse.

A careful investigation of the relative geographical distribution of body-lice and of typhus, though open to various sources of fallacy, should help to determine the relationship of typhus and lice. So far as such evidence is available, it points strongly to a preference of typhus for countries in which body-lice are or have been most prevalent. This is a hard saying in view of the fact that the British Isles have been regarded generally as the favourite haunts of typhus.

The filth of the streets and watercourses of London in Tudor and Stuart times was notorious throughout Europe, and if we may credit the much-travelled Erasmus, their condition was matched by that of the interior of the houses. He ascribes the sweating sickness to "the filthiness of the streets and the sluttishness within doors." "The floors," says he, "are commonly of clay strewed with rushes, which are occasionally renewed, but underneath sometimes lies unmolested a twenty-years-collection of beer, grease, fragments of fish, spittle, the excrement of dogs and cats, and everything abominable."

Stuart literature, too—Pepys' "Diary" for example—gives one a lowly idea of the contemporary standard of personal cleanliness, and there is evidence that suggests that a change of habit in this respect was a Stuart importation from France. I am disposed to regard the intense cult of cleanliness in the average British-born person of to-day as evidence, by its very fervour, of a comparatively recent conversion. Far be it from me to hazard any suggestion as to the reason of the persistence of typhus in Ireland after it has disappeared from England. Perhaps, however, I may quote what Hirsch had to say in 1881. "It is always and everywhere," he says, "the wretched conditions of living, which spring from poverty and are fostered by ignorance, laziness, and helplessness, in which typhus takes root and finds nourishment; and it is, above all, in the want of cleanliness, and in the overcrowding of dwellings that are ventilated badly or not at all, and are tainted with corrupt effluvia of every kind. The prototype of these conditions is found in Ireland, which is the greatest sufferer from the disease; all observers agree that in them lies the true cause of typhus, unconquerable in, and inseparable from, the Irish proletariat, faithfully following the Irishman whenever he transplants himself and his misery."

In conclusion, let me adduce one piece of direct positive evidence from Murchison, all the more weighty because he had no conception of its import. He mentions two occasions only on which he himself personally investigated the local conditions under which a sporadic case of typhus had seemingly arisen *de novo*. In one of the two he had the assistance of the medical officer of health of the district, and this is what they found: "The habits of the family were filthy in the extreme. The parish inspector found the rooms alive with vermin, and the nurses in the fever hospital declared that they had scarcely ever known patients admitted in such a filthy state."

DISCUSSION.

Dr. F. M. SANDWITH said he would like to express the pleasure it gave him to listen to Dr. Crawfurd's paper. There were many instances of more recent date, doubtless not unfamiliar to the author, of the confusion between plague and typhus. It used to be thought that plague was only the concentrated quintessence of typhus, and that the latter often preceded plague. There is the story of Dr. Clot Bey, who was well acquainted with plague in Egypt, and who, on seeing cases of typhus in a London fever hospital, with parotid buboes, said, "Yes, in Egypt we call those cases plague." Dr. Crawfurd was no doubt aware that at Benghazi (Tripoli) typhus and plague had been called by the same name, and the two diseases confused with each other of late years. With regard to war epidemics, he had only read about the Crimea, but in 1878 he saw hundreds of cases of typhus on the Turkish side, and there were said to be 100,000 cases on the Russian side. And, according to the newspapers, similar cases were said to be occurring now in Turkey. There was no doubt, as Dr. Crawfurd said, that in regard to overcrowding, which had been looked upon as the chief predisposing factor of typhus, and more or less of plague also, it was simply that overcrowding meant something favourable to the vermin which were the carriers of disease. It was obvious that if one had no fire in the house in winter, if the windows, which were very small, were stuffed up with clothing, and if one crowded on to the bed all the available blankets, and persons in the house slept as near together as possible, the vermin present stood a very good chance of getting fed. When Dr. Crawfurd referred to the flea season being in the summer months, no doubt he was referring entirely to Europe; and he would like to remind the author that there was a definite flea season in some countries; that flea season, which in Cairo came to an end in June, explained the fact that plague had never been epidemic in any severity in Cairo after June 24, St. John's Day. When one went farther south there were no fleas, and therefore no plague, and, he believed, no typhus either. Apropos of that—in case any hearer might feel inclined to contradict him—the disease in the Sudan which killed off many people in the Mahdi's time was probably cerebrospinal meningitis, not typhus. As an old pupil of Murchison's, he was very much interested in reading while in Egypt his statement that typhus was unknown in Africa. What that author probably had in his mind was Tropical Africa. He (Dr. Sandwith) found plenty of typhus in Egypt, not only in prisons, where there was also relapsing fever, but elsewhere. And it was a modern corroboration of Dr. Crawfurd's researches that when cleanliness was introduced into the prisons, and the prisoners were made to wash themselves and each other, the quantity of lice diminished, and typhus and relapsing fever came almost to an end ; not quite, however, for it occurred in successive outbreaks in the same prisons.

Dr. CRAWFURD, in reply, said that one day he met in the street an English medical man whose practice was in the Sudan along with an Egyptian medical man, and to them he put the question about typhus. The doctor who was practising in Cairo and thereabout said at once that he saw a great deal of typhus, while the practitioner in the Sudan thought he had never seen a case. So apparently the line of demarcation was drawn somewhere between the two. With regard to his paper as a whole, the purpose in reading it was to suggest that if it was possible, from the history of medicine, to substantiate the cause of one disease, it would probably be so in the case of others also. He might be pardoned for mentioning the personal point that it was from reading the history of medicine that he concluded that it must be lice which conveyed the disease ; it was only when he looked up the most recent pathology that he found the point had already been determined.

Notes on Early Portraits of John Banister, of William Harvey, and the Barber-Surgeons' Visceral Lecture in 1581.

By D'Arcy Power, F.R.C.S.

One morning shortly before Dr. Frank Payne left Wimpole Street to live at Barnet, I went in to look at his books, which he was always glad to show his friends, and he asked, "Have you ever been to the Hunterian Library at Glasgow?" I answered, "No, but everyone says it is well worthy a visit because William Hunter was a greater collector of rarities than his brother." Dr. Payne said, "I was there a little while ago and the librarian showed me a most interesting picture. I had it photographed, and thinking of you, I had an additional proof made which you will accept from me as a present. The picture represents John Banister, a surgeon. I know nothing about it, but it is so full of detail that it could only have been painted by a miniaturist. You like answering riddles, so that some day perhaps you will be able to tell us more about it, when we have started that Society for Medical History about which we have so often talked." I took the photograph home, had it framed, and in 1910, when I was editing some Treatises of John Arderne for the Early English Text Society, I had occasion to visit Glasgow to collate my proofs with the MSS. preserved in the Hunterian Library. Mr. Galbraith, the librarian, was extremely courteous, and showed me the picture (Plate I) which had excited Dr. Payne's attention. It is contained in a volume of Master John Banister's Anatomical Tables, in folio, bound late in the sixteenth century. The picture is double-page, mounted on guards and backed with modern white paper.

Dr. John Young's Catalogue of the Hunterian Museum Library (Catalogue of Manuscripts), describes it in the following words (p. 290):—

"The double-page picture represents John Banister standing between a skeleton at which he points with a silver-mounted cane, and a corpse in course of dissection, on whose exposed viscera he rests his left hand. He wears a narrow-brimmed velvet bonnet, master's robe and white surgeon's sleeves, as do also his four assistants. He also wears a jewelled gold pendant suspended by a black silk ribbon round his neck. One of his assistants wears a somewhat similar jewel of blue enamel and pearls.

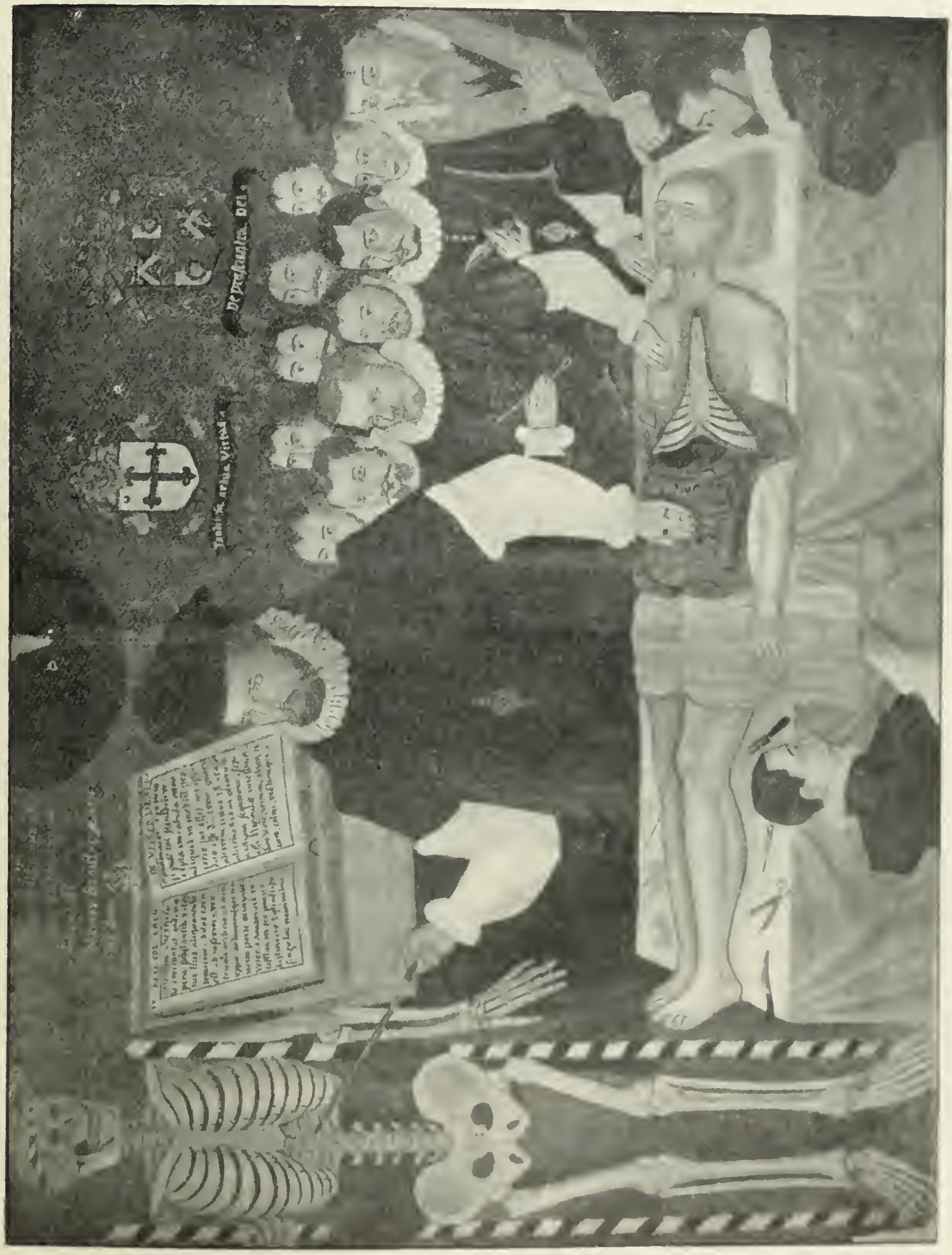


PLATE I.

John Banister (1533-1610) delivering the Visceral Lecture at the Barber-Surgeons' Hall, London, in 1581.

(From a contemporary painting now in the Hunterian Library at Glasgow.)

"Behind the lecturer on a desk lies a book open at pages 419, 420, with the following title: 'REAL. COL. CREM. DE VISCER. Lib. XI, above which in red: 'Anatomia scientiæ dux est | aditumque ad dei agnitio | nem præbet. | Iohannes Banister Aetatis | sui Anno 48 Anno Domini 1581.' A white-bearded doctor in furred robe and brimmed bonnet points his left forefinger at the head of the subject. One (left) of the two assistants in the foreground is passing an instrument to the other (right), while behind the two others (facing) are eight faces (of students?).

Above these heads and immediately under the date (given above) are two heraldic blazons. On the left, for arms, a shield (argent) bears a cross flory (sable), and a crescent (sable) in the dexter canton (difference); for crest, a peacock proper on a steel closed helmet with red and white mantling, and for motto, Tendit in ardua Virtus. On the right for arms, a shield divided quarterly by a St. George's cross (gules), surcharged with a lion passant regardant (or) bears 1 and 4 (sable) a chevron (argent) dividing three b's (argent), 2 and 3 a Tudor rose (gules) crowned (or) on a field party per pale (argent and vert) with chained boarhounds (?) (tenny) spotted (argent gules and vert); for supporters, for crest [an opinicus] (tenny), and for motto, De praescientia Dei."[1]

The picture represents John Banister delivering the "visceral lecture" in the Barber-Surgeons' Hall at Monkwell Street. The carefully painted figure in the Master's hat and the furred gown is probably the Master of the Company for the year 1581. If so, he is Robert Mudesley, to whom Thomas Vicary bequeathed "my best single gowne faced with black satten." He is also mentioned in the 1569 grant of arms as one of those governors of the Barber-Surgeons Company who petitioned for some permanent mark in their armorial bearings to commemorate the union of the Barbers and Surgeons. The grant by letters patent took the form of, "an augmentation in chief to their old and auncient arms with heaulme and crest to the same." It was perhaps for this reason that the painter has introduced the new coat-of-arms into the picture, containing a lion of England and two crowned Tudor roses.

---

[1] The arms of the Barber-Surgeons which are here described incorrectly are those granted to the United Company by Sir Gilbert Dethick, Garter King at Arms, in 1569. They are: "Quarterly the first sables a cheveron betweene three Flewmes argent; the seconde quarter per pale argent and vert on a spatter of the first, a double Rose gules and argent crowned golde; the third quarter as the seconde and the fourth as the first. Over all on a Crosse gules a lyon passant gardant golde; And to their Creaste upon the heaulme on a Torce argent and sables an Opinacus golde; Mantelled gules doubled argent; Supported with two Linxe in their proper coulor about their neckes a crowne with a chayne argent pendent therat." The motto "De praescientia Dei" first appeared in the armorial bearings of the Barber-Surgeons after this grant and it is still used by the Company of Barbers.

The two senior stewards of anatomy are distinguished by their badges. It was enacted in 1555 that there should be chosen every year two "for the Anathomye and other two also to be chosen for to be stewards; so that two always shall stande for ij yeres because they that doo not worke of the Anatomy the one yere being Stewards for the provysyon of victualls they shall worke the other yere following. And they that shalbe chosen shalbe alwayes for the first yere Stewards, because that they shall see the makynge of them the yere before that they may be the more practysed in the doynge the next yere the sayed Anathomye that after it maye appeare by the workmanship that they be the dooers. Yf the Master and governors do goo about to breake the same acte they shall lose for a fyne to the hall xls."

The class consists of the members of the Barber-Surgeons Company who were obliged to attend the lectures under penalty of a fine.

The picture is interesting from many points of view, and first historically. It represents almost with the accuracy of a photograph the method of conducting anatomical teaching in London at the end of the sixteenth century, and so far as I know it is the only representation of the lectures given at the Barber-Surgeons' Hall. It furnishes two additional facts about John Banister. It is clear that he was the Company's visceral lecturer in 1581 which was not previously known, and it fixes the date of his birth, because if he was aged 48 in this year, he must have been born in 1533, and not as has been generally stated in 1540. He was armigerous, and clearly belonged to one of the Surrey families of Banester, who bore for arms "Argent a cross flory sable and for crest a peacock sitting, taking in its beak a serpent twined round its neck all proper." The crescent—his sign of cadency—shows him to be the second son. The minute accuracy of the picture is shown by the vade mecum which is used as the text of the lecture, and it will be noticed that the skeleton is supported and crowned with the colours of the Barbers Company, and a wreath of the same surmounts the helmet in Banister's arms. The book on the reading desk is "Realdus Columbus," and from its size I thought it must be the folio edition printed at Venice in 1559. Reference showed, however, that the passage in this edition is on folios 227 and 228. The picture gives the pages 419 and 420. Looking about for another edition I found the 8vo published at Paris in 1572, and on turning to chapter 5 of book xi, the latter part of the passage quoted occurs just as the painter saw it on pages 419 and 420. The minute detail is also shown in the drawing of the scissors, the different shapes of the dissecting knives, the double-headed retractor held by the steward of the anatomies, and by the Company's badges worn by the lecturer and stewards. Of the drawing from the artistic point of view I am unable to speak. The two main figures of John Banister and the Master of the Company seem to me to be careful studies from life; the stewards and the audience are less carefully drawn. The body seems to have been drawn from the actual subject, who has a shrunken right leg—perhaps the results of old infantile paralysis—for the right foot is in a valgus position. The lecture is given on the passage: "Intestina igitur a ventriculo exoriuntur; eademq'; pene substantia videntur; licet aliquantulum tenuiore. Situs eorum est ab inferiori ventriculi orificio ad anum usque; abdominisq'; majorem partem occupant. Veteres Anatomici intestina in sex partes distinxere, distinctisq'; singulas nominibus appellauere. Ego vero si post tot seculorum recepta vocabula noui aliquid in medium proferre fas esset, intestina duo esse dicerem, quorum alterum tenue est, crassum alterum. Sed ut aliorum vestigia sequamur; (neque enim temere a veterum placitis discedendum est), sex esse dicemus intestina, duodenum, inquam, jejunum, ileon, coecum, colon, rectumq'."

It is possible by the help of this picture to reconstruct the life of John Banister, and I do so in the following words: He was born in 1533, and was perhaps the second son of John Banester, whose name appears seventy-ninth in the list of the members of the Barbers Company for the year 1537, when Thomas Vicary was third in seniority of the freemen, or more probably of John Banester of Cobham, one of the Barons of the Exchequer. We learn nothing more about him until 1563, when he acted as surgeon to the forces sent under the Earl of Warwick to relieve Havre. Here he became acquainted with William Clowes, who speaks of him as "master Banester, my dear and loving friend." In 1572, he was admitted a member of the Barber-Surgeons Company, and there is a note in the records saying that "Mr. Bannester of Nottingham was sworn and admitted a brother of this mystery. Whereupon he hath granted to the House yearly twenty shillings so long as he liveth, and to be liberal and commodious to this house in what he may and will send yearly a buck or two and hath paid ten shillings and shall have his letter of licence." Clowes may have helped him to this favour, or his inherited influence in the Company may have assisted him. In 1573 the University of Oxford granted him a licence to practise medicine. The record runs, "Banister John; after seven years in med[icine] suppl[icates] for lic[ence] to prac[tise] med[icine] 30th June 1573." He thus acted both as physician and surgeon, a very unusual combination at this time when the surgeons were still servants to the physicians.

In 1581 the picture shows that he was lecturing at the Barber Surgeons' Hall. His predecessor, in 1577, was Thomas Hall, brother of John Hall, of Maidstone, who wrote "the Historiall Expostulation." In 1585 he served on board ship during the Earl of Leicester's expedition to the Low Countries, and in 1593-94, on February 15, he was licensed to practise medicine by the Royal College of Physicians in obedience to the following letter from Queen Elizabeth:—

"ELISABETH R. "BY THE QUEEN.

"Trustie and wel beloved. We greet you well. Whereas we are credibly informed that our well beloved subject, John Banister, gent., hath of long time practised the art of Chirurgerie in sundry places of this our realme, and also in some service upon the seas, and for his honestie and skilfulness therein was heretofore entertained by our late cousens and counsellors the Earles of Warwick and Leycester; and understanding that in the exercise of his science he hath always jointlie used the art of Physick with Chirurgerie, and that with such discretion and profit, that there hath not been made any complaint against him, but on the other side divers reports that he hath doone very much good to many persons, and especially in and about our citie of London, where he desireth to end his old yeares in quietness, as I truste he shall do, unles he happen to be molested by any of your College, by reason of his said practice. In respect of the good report which we have had of his sufficiency and honestie, and for the speciall favour we beare to all men of skill, experience and good behaviour, we have thought good to require you forthwith, upon the receipt hereof, to take order in yo^{r} College that the said John Banister may be by you and the College licensed and tolerated to practise the science of Physick and Chirurgerie, without any yo^{r} interruption, molestation or suite so long as you shall not find any just and apparent cause to the contrary. Whereof we doubt not he will alwayes have an especial care.

"Given under o^{r} Signet at o^{r} mannor of Otelands, the xxviii. day of Julie, in the xxxv. yeare of our Reigne. [1593].

"J. WOOD."

The minutes of February 15, 1593-94, continue: "Quibùs lectis, visum est universo Collegarum coetui, ut respectu illarum literarum a suâ Majestate scriptarum tam gratiosè et favorabiliter, permitteretur praedictus Joannes Banister ad praxin: eâ tamen adjectâ conditione, ut in omni graviori morbo, et pleno periculi, unum aliquem ex societate Collegii ut adjutorem sibi in illâ curatione accersat et adjungat."

To those who know the history of the time it must be evident that this letter to the College of Physicians was a deliberate attempt to further the union of medicine and surgery which was the ideal of the later Tudor revival of surgery. John Hall, Gale and Clowes had all written strongly in favour of it. Banister alone was strong enough to be acceptable both to the physicians in London and at Oxford as well as to the surgeons. He probably accepted without demur the condition attached to the London licence. The presentation of patients in danger of death or maim to the Master and Wardens of the Barbers and Surgeons Guilds had been an immemorial custom. It was a safeguard to the practitioner as well as to the patient so long as patients were thought to die of their doctor instead of in spite of him.

It is probable that from this time onwards Banister lived in London and in Silver Street. He died in 1610 and was buried in the church of St. Olave's, Silver Street. The church was destroyed by the Great Fire, but it contained the following epitaph in verse which bears a decided resemblance to the poetry published by his old friend Clowes:—

"Great men that ne'er did good in all their Dayes,
But at the very Instant of their Death,
Find yet no mean Commenders of their Praise,
Although it lasts no longer than a Breath.
Shall then good Men, though lesser in Degree,
Finde none to give them Right or Equity?
If one shall say the great Man's Life was such,
So good, so full of Hospitality;
When God doth know, he ne'ere did half so much,
Though thus he must be graced with Flattery:
Shall meane Men, who such Workes truly did,
Be nothing spoken of? Oh, God forbid!
Not then as equalling with any Great,
My fatherly good Friend, John Banister,
No more but Truth of thee, let me repeate,
A sonne's Love-Tears, thy Body to interre.
That such as knew thee, better farre than I,
May say thy Vertues did not with thee dye.
Thy Skill and Practice, that it self commends,
Some of the best have truly found the same;
Not partially employed to wealthy Friends,
But even the poorest Wretch, the Sick and Lame

Felt of the best; some Difference there might be,
The Rich pay'd somewhat, poore Men had it free.
Thy Care and Cash laid out, for common Good,
In greater Measure than came in againe.
But that Heaven's Blessing, with thy Bounty stood,
Hardly had stretched so many to sustain.
But it is true, the liberal Heart God loves,
And from him still all Cause of Lacke removes.
Thy Weekly Charity given to the Poore,
In Bread, beside, in Money from thy Purse:
Even in the hardest yeares dealt at the Doore,
When some repined that every Day did worse;
Make poore Men say, our good Relief is gone,
Let them goe to thy Find-faults and have none.
Poore maymed Souldiers, sore sick-hearted Men
That under Miseries hard Crouch did bow
Were freely cured, methinkes they cry, Lord, when,
Where shall we find our good Physician now?
I doubt not, but some others will as much:
Yet (in these Dayes) we find not many such.
Sleep then, thou happy soule, in endlesse Rest,
All good Men's Groanes, be poured on the Grave;
Live thou in *Abraham's* Bosom with the Blest
Where Faith and Workes due Recompence shall have.
My sight grows Dimme, sighing my Heart makes sore,
Tears blot my Paper, I can write no more."

"Banister was famed for his kindness to the poor," says Dr. Norman Moore, "especially to old soldiers, and for his extensive professional reading." He published :—

(1) "A Needful, New and Necessary Treatise of Chirurgerie, briefly comprehending the General and Particular Cure of Ulcers." (London, 1575, 8vo.) The book is dedicated to Thomas Stanhope, Esq., high sheriff of Nottinghamshire. Its substance is extracted from various authors, ancient and modern, particularly Galen, Calmetius and Tagaultius. It is by no means devoid of learning and method, but contains no improvement of theory or practice which can be cited as the writer's own. Several recipes of topical medicines of his own invention are subjoined, but they possess no intrinsic merit.

(2) "The History of Man sucked from the Sap of the most approved Anatomists." Nine books. (London, 1578, folio.)

(3) "Compendious Chirurgery: gathered and translated especially out of Wecker." (London, 1585, 12mo.) This is not a mere translation, but at the end of each chapter annotations are added, in which the author's errors are frequently corrected, and his deficiencies supplied from other writers, or the translator's own experience, with considerable

learning and judgment. "Indeed, Wecker," says Mr. Aiken, from whom I quote, "was an author who greatly required such an annotator, being a servile copyist of the ancients without reflection or method. One of the most important corrections made by Banister is his declaration against the use of caustic applications in punctures, and stitching in incised wounds of the tendons which Wecker had recommended."

(4) "Antidotary Chirurgical, containing Variety of all Sorts of Medicine, &c." (London, 1589, 8vo.) This is dedicated to the Earl of Warwick. It is a large collection of chirurgical formulæ, gathered out of various authors, with the addition of several of his own and of contemporary English surgeons. Some of these last are of an elegant simplicity, and are in general less compound than those of foreign practitioners. Those of Balthrop are among the best. Banister acknowledges the generous help of his contemporaries, Balthrop, Clowes and Goodrus.

(5) A collected edition of his works was published after his death under the title, "The Workes of that famous Chyrurgian, Mr. John Banester," in six books. (London, 4to, 1633.)

Richard Banister, the oculist of Stamford, in Lincolnshire (died 1626), was a near kinsman, perhaps a nephew of John Banister.

Throughout the Middle Ages the surgeons of London were taught systematically and practically. The Barber-Surgeons Company from its formation in 1540 organized a regular staff for the purpose, consisting of a Lecturer, who was sometimes a member of the Company, but was more often a young physician fresh from Oxford or Cambridge, of four assistants, sometimes called "Masters" and sometimes "Stewards" of the Anatomies, and an audience consisting of the members of the Company. The subjects were obtained from the place of execution, and were four malefactors yearly. The lectures were three in number, the "osteological," the "visceral" and the "muscular," and great care was taken that they should be conducted decently in order. They were public or at least so public that any person could attend upon the introduction of a member of the Company, and they ended with a dinner, which was one of the most important annual functions of the corporation. The following extracts will give some idea of the conduct of the business: "The body having been brought to the Hall," it is ordered in 1567 that, "there shal be pyllars and rods of iron made to beare and drawe Courtaynes upon and aboute the frame where within the Anathomy doth lye, and is wrought upon, for bycause that no person or persons shall beholde the dissections of the body, but that all may be made cleane and covered with fayer clothes untyll the doctor shall come and take his place to read and declare upon the parts desected. And also yet fordermore that there shal be a case of weynscot made with paynter's worke upon it, as seemly as may be done ffor the skelleton to stand in."

Care was taken not only in choosing the lecturer, but his material comfort was provided for. It was enacted in 1555 that the stewards "which be appointed for the Anathomye for the year next following must sarve the Doctor and be about the body. They should see and provide that there be every yere a matte about the harthe in the hall that Mr. Doctor [be] made not to take colde upon his feete, nor other gentlemen that doo come and marke the Anatomye to learne knowledge. And further, that there be ij fyne white rodds appointed for the Doctor to touche the bodye when it shall please him, and a waxe candell to loke into the bodye, and that there shall be alwayes for the Doctor two aprons to be from the shoulder downwarde; and two payre of Sleaves for his hole Arme with tapes for chaunge for the sayed Doctor, and not occupye one Aprone and one payr of Sleaves every day, which ys unseemly. And the Masters of the Anathomye that be about the bodye to have lyke aprones and sleaves every daye both white and cleane, yf that the Masters of the Anathomye that be about the Doctor do not see these thinges ordered and that their knyfes, probes and other instruments be fayer and cleane accordingly with Aprones and Sleves, if they doo lacke any of the said things afore rehersed he shall forfayte for a fyne to the hall xls." It is to be remembered, too, that if fines were not paid, the Company had the power of summary committal to the Compter or even to Newgate.

The attendance at the lectures was compulsory. The ordinance of 1572 enacts that "every man of the company usinge the mystery or faculte of surgery, be he freman, fforeyne, or alian straunger shall come unto the Anathomye, being by the Beadle warned thereunto. And for not keepinge their houre both in the forenoone and also in the afternoone, and being a freman shall forfayt and paye at euery tyme iiijd. The fforeyn in like manner and the Straunger euerye tyme vjd. The said fynes and forfaytes to be employed unto the Anathomysts for the tyme beynge, towards theire charges within the tyme of the sayd Anathomye. And also for not comyng in all the tyme of the

Anathomye (having lawful occasion of absence) the Freeman shall pay vjd., the fforreygne viijd., and the Straunger xijd. And to be employed in manner and fourme aforesaid. And also iijs and iiijd. to the Masters and Gouernoures of the said Mystery for their summons brakinge notwithstanding. Provided also that they come well and decently appareyled for their own honestye, and also for the worshippe of the companye."

The following directions, which were evidently given by an old clerk of the Company to his successor, new to the office, show how the business of a lecture was conducted. It is headed: "Form of the business at the time of a Public Demonstration of Anatomy."

"So soon as the body is brought in deliver out your ticketts, which must first be filled up as followeth — 4 sorts: The first fforme to the Surgeons who have served the office of Master you must say, Be pleased to attend, &c., with which summons you send another for the demonstrations; to those below the Chaire you say, Our Masters desire your Company in your gown and Flatt Cap, &c., with the like notice for the Demonstrations as you send the Antient Master Surgeons. To the Barbers, if Ancient Masters, you say, Be pleased to attend in your Gound only; and if belowe the Chaire then, Our Masters desire, etc., as to the others above without the Tickett for the Demonstrations.

"The body being by the Masters of Anatomy prepared for the lecture (the Beadles having first given the Doctor notice who is to read, and taken orders from the Master or Upper Warden of the Surgeons' side concerning the same), you meet the whole Court of Assistance in the Hall Parlour, where every gentleman clothes himself, and then you proceed in form to the Theatre (vizt), the Beadles going first, next the Clerk, then the Doctor, after him the severall gentlemen of the Court. And having come therein, the Doctor and the rest of the Company being seated, the Clerk walks up to the Doctor and presents him with a wand and retires without the body of the Court until the lecture is over, when he then goes to the Doctor and takes the wand from him with directions when to give notice for the reading in the afternoon, which is usually at five precisely, and at One of the clock at noon, which he pronounces with a distinct and laudable voice by saying: 'This Lecture, Gentlemen, will be continued at Five of the clock precisely': having so said, he walks out before the Doctor, the rest of the Company following down [to] the Hall Parlour, where they all dine, the Doctor pulling off his own robes and putting on the Clerk's gownd first — which has been usuall for him to dine in — and after being plentifully regaled, they proceed as before untill the end of the third day, which being over (the Clerk having first given notice in the fforenoon that the lecture will be continued at Five of the clock precisely, at which time the same will be ended), he attends the Doctour in the Cloathing Room, where he presents him, folded up in a piece of paper, the sum of 10 li.;0;0, and where afterwards he waites on the Masters of Anatomy and presents each of them in like manner with the sum of 3 li.;0;0, which concludes the duty of the Clerk on this account.

"N.B.—The Demonstrator, by order of the Court of Assistants, is allowed to read to his pupills after the Publick Lecture is over for three days and untill Six of the clock on each day, and no longer, after which the remains of the body is decently interred at the expense of the Masters of Anatomy, which usually amounts unto the sum of 3;7;5."

The second picture (Plate II, p. 31) I wish to show you is this oil painting on a panel of Dr. William Harvey, and you will see at once that it is in many respects similar to that of John Banister. I bought it in London in July, 1912. It is a three-quarter length of Harvey, who is represented standing in his study with his left hand resting upon a table, whereon is spread a diagram of the arterial system. The face is a more pleasing likeness than many of his other portraits, and shows him with long grey hair and a skull-cap. He is clothed in a long-sleeved, damascened waistcoat, confined at the waist by a belt, with a collar and wristbands of point lace beautifully painted. Over all he wears a long gown heavily trimmed with fur. The thighs and legs are not shown. The background is a green curtain partially drawn aside to show the shelves of the study, and on the curtain is a description in red letters :—

Gulielmus Harveus, M.D.
Aet. sue 61
1639

The accessories are interesting. On the table a watch keeps down the edge of the diagram to prevent it folding up. There is an inkstand with a quill-pen in it, and a terrestrial globe. Immediately behind the table is a shelf on which is a simple microscope, with a coarse and fine adjustment on the principle of the modern automatic letter-weighing machine ; a retort partly filled with fluid, a pair of scissors, a dissecting knife, and a sheet of paper. The bookcase consists of six wooden shelves divided by a median partition, mere rough shelves. The lowermost shelf has a urine glass and a minim measure lying at the extreme edge. In the partition nearest Harvey are two flasks, one containing a green the other a red fluid ; a wide-mouthed jar covered with parchment, the jar is earthenware and behind it are two square bottles like case bottles. A quire of loose paper leans against it. On the other side of the partition of this lower shelf are two bottles, one unstoppered the other stoppered, filled respectively with a red and green fluid. There is also an object like a catherine-wheel which I do not recognize. The second shelf from the bottom contains thirteen dumpy duodecimo volumes, bound uniformly in parchment, whilst upon the other side are three quarto volumes well bound in morocco and piled one above the other. The third shelf from the bottom is filled with books, four of which are smaller than the rest. The fourth shelf is wholly filled with books with the exception of a space showing where one has been removed. The fifth shelf contains books of various sizes. On the top shelf are two skulls, a square case upon which stands a stoppered phial filled with some red substance, and four earthenware jars, whose mouths are closed with parchment covers tied on.

The whole scheme of the picture is carried out in dark green and red, the effect being pleasing and subdued.

The portrait of Harvey is a faithful representation of the great physician as the painter saw him, just as I have very little doubt that the picture of John Banister is a good likeness. Both are sober representations painted by men who reproduced with photographic accuracy what they saw. No attempt is made to introduce any artistic element, and detail takes the place of idealization. In the picture of Banister the badges and the rings on the lecturer's finger are painted with great care, and I am not certain that what seems at first sight to be a second ring on the left fourth interphalangeal joint is not in reality a piece of rag tied on with a thread. The arms of the Lecturer and of the Barber-Surgeons Company are depicted with the accuracy of an heraldic artist, and the Barbers' colours are painted on the supports of the skeleton, just as we know was really the case. In like manner in Harvey's picture, the painter has lavished a great deal of work on the fur of the robe, on the damascene of the waistcoat, and on the point lace. It is a little remarkable that, although there is plenty of room on the curtain for a coat-of-arms, none is represented. It may mean that Harvey was not armigerous.

Dr. William A. Shaw contributed an interesting paper to the

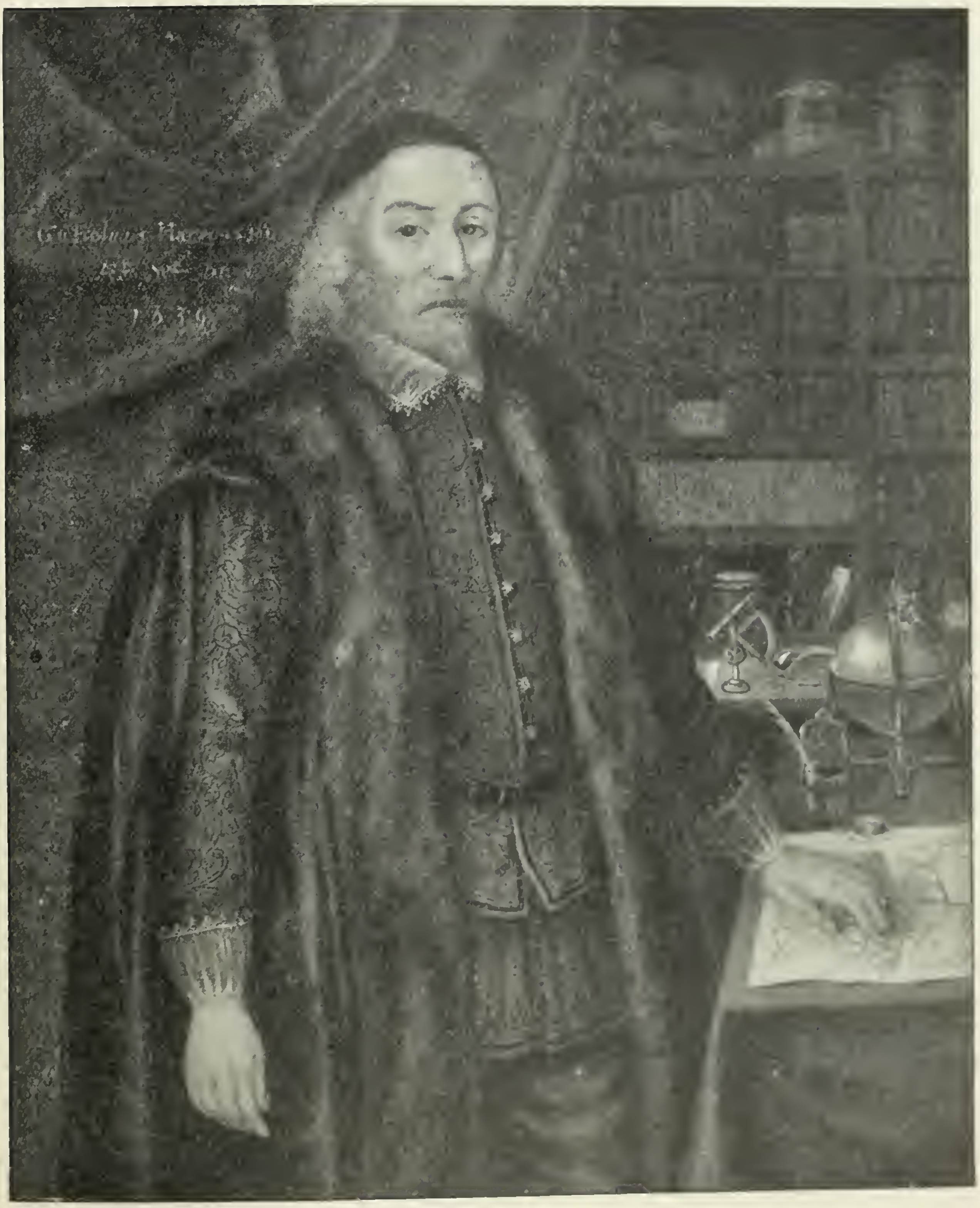


PLATE II.

William Harvey, M.D. (1578-1657), at the age of 61.
(From a contemporary painting in the possession of Mr. D'Arcy Power.)

Connoisseur for October, 1911,[1] upon "An Early English Pre-Holbein School of Portraiture," for a knowledge of which I am indebted to Mr. F. G. Thomson. Dr. Shaw thinks that an indigenous school of portraiture flourished in England between the reigns of Henry VI and Elizabeth. From first to last it was entirely native, indigenous and national. It took nothing from and owed nothing to foreign influence. In its forms, its technique, its characteristics or inspiration, and its limitations it was English, and merely English from its dawn to its close. "The outstanding and distinguishing features of this art," says Dr. W. A. Shaw, "were:—

"(1) *Technical.*—(*a*) The consistent employment of an oil medium from a time long antecedent to the use of an oil medium on the Continent. (*b*) Profuse and most skilful application of gold, both for details and ornamentation rather than for backgrounds. (*c*) An absolutely unequalled skill in the painting of jewels, precious stones, details of ornament and fur. (*d*) Profundity and richness and transparency of colour equal to anything that Flemish or Italian art can show. (*e*) A general preference for a level green background, much quieter and more neutral than the terre verte backgrounds of the French or the German schools. (*f*) The background is never decorated or floriated, and the device of a landscape was only in vogue for a short period about the reign of Edward VI., and was never assimilated by the native English artists. (*g*) A decided preference in the earlier stages for the stiff and infantile device of arranging the figures square behind a parapet. (*h*) In the vast majority of cases the employment of panel rather than canvas, and the panels prevailingly small.

"(2) *Spiritual.*—In its essence the art reflects the inherent abiding qualities of the English race itself. It is perfectly sincere, trúthful, unassuming, jolly, blithe and debonair, but matter of fact, business-like, and completely devoid of romanticism, and of imaginative artistic warmth except in the colour sense. From first to last the power of idealization and characterization is absent. The figures are so completely detached from the backgrounds that they appear almost as if done separately, and then stuck down upon it as a photographer might mount a photographic print. In the face work the naturalness of portrayal is accomplished by a freshness of flesh colouring, and by a subtle power of moulding which will challenge comparison with the work of any school."

---

[1] *Connoisseur*, 1911, xxxi, pp. 72-81.

Dr. Shaw believes that the painters of this school were the King's serjeant-painters, who were usually skilled artists. Nicholas Hilliard (1537-1619), who was serjeant-painter to Elizabeth, was noted as the first English painter of miniatures. His drawings were executed with much care and fidelity, and with great accuracy of detail in costume, but the faces are pale and shadowless. His work was excelled by his pupil, Isaac Oliver or Olivier (1556-1617), who also paid especial attention to the details of costume, armour, jewels and other accessories in his paintings. These are exactly the points shown by the picture of John Banister. It is minutely accurate in detail, and, as Dr. Payne originally remarked, it must have been painted by a miniaturist. The main portraits stand out pre-eminent, but very little skill is shown in the general grouping, and I think it is plain that the painter had in his mind Holbein's picture commemorating the union of the Surgeons Guild with the Barbers Company, which is still one of the treasured possessions of the Barbers Company at Monkwell Street. I think, therefore, that the picture was certainly painted by a member of Hilliard's school, perhaps by one of the pupils, but most likely by the serjeant-painter himself.

Turning now to the portrait of Harvey, it is interesting to notice its date. It was painted after April 1, 1639, the year in which Harvey was appointed Senior Physician in Ordinary to the King. Dr. Bethune died in July, 1639, and the Letter Book of the Lord Steward's Office contains the following order about his successor:—

"CHARLES R.

"Whereas we have been graciously pleased to admit Dr. Harvey into the place of Physician in Ordinary to our Royal Person, our will and pleasure is that you give order for the settling of a diet of three dishes of meat a meal, with all incidents thereunto belonging, upon him the said Doctor Harvey, and the same to begin from the seventeenth day of July last past and to continue during the time that the said Doctor Harvey shall hold and enjoy the said place of Physician in Ordinary to our Royal Person for which this shall be your warrant.

"Given at our Court of Whitehall the sixth of December 1639.

"To our trusty and well-beloved Councillors Sir Henry Vane and Sir Thomas Jermyn, Knights, Treasurer and Comptroller of our Household or to either of them."

The appointment in addition to this "bouge of Court" carried with it a lodging at Whitehall and a pension or annual payment of £400 a year.

In August, 1642, shortly after the King had left London to raise his standard at Nottingham, a mob broke into Harvey's lodgings at Whitehall, stole his goods, and scattered his papers. These papers consisted of the records of a large number of post-mortem examinations with his observations on the development of insects and a series of notes on comparative anatomy. Harvey bitterly regretted the loss, and laments it in the following words: "Let gentle minds forgive me if, recalling the irreparable injuries I have suffered, I here give vent to a sigh. This is the cause of my sorrow:—Whilst in attendance on His Majesty the King during our late trouble, and more than civil wars, not only with the permission but by the command of the Parliament, certain rapacious hands not only stripped my house of all its furniture, but, what is a subject of far greater regret to me, my enemies abstracted from my museum the fruits of many years of toil. Whence it has come to pass that many observations, particularly on the generation of insects, have perished with detriment, I venture to say, to the republic of letters."

A consideration of this picture shows, I think, that it belongs to the same school as that of Banister—the school of the Court Painter. There is a similar absence of imagination; a similar prominence and sober painting of the subject; the same minute fidelity in the details of the background. Everything points to the fact that the painter was unaccustomed to idealize, and was more conversant with actual facts. It is the same difference that we notice in the Tower Bridge and in Waterloo Bridge—the one is mechanical and useful, the other is graceful as well as solid and convenient. It was the business of the King's Serjeant-Painter to overlook the painting of carriages, heraldic drawings, &c., but he was also an artist, and there is very little doubt that he often added to his income by painting clients. From the pictures left to us, it seems as if these clients had their portraits painted when they succeeded to Court appointments, or had gained some prominent position. We know, for instance, that Dr. Linacre, Dr. Butts, Dr. Caius, Nicholas Alsop the King's Barber, and others, were painted in this manner. I have shown you the portrait of John Banister, and I believe that this portrait of Dr. William Harvey was painted in like manner by the King's Serjeant-Painter — one of the De Critz's — immediately after his promotion to the office of Senior Physician in Ordinary to Charles I. If this was the case, the little books on the shelves in the background may be those very papers which were destroyed by the mob three years afterwards, the room itself being the cabinet or study in the newly allotted rooms at Whitehall.

DISCUSSION.

The PRESIDENT (Sir W. Osler, Bt., F.R.S.) asked whether Mr. Power had compared the picture of Harvey with other portraits with reference to his appearance in 1639. It was of interest, as there were many portraits of Harvey extant, some of which were not originals. In this picture he looked an older man than in any other except the one in the National Gallery. A supposed portrait of Harvey by Jansen, dated 1656, had been for sale for some years. It represents a middle-aged man resembling Harvey, but at that date he was an old man. The pedigree of the picture, as given to him, was interesting, in that it came from Colonel Harvey Branscombe, a collateral descendant of Harvey. But Colonel Harvey Branscombe wrote that he had never owned such a picture: if he had he certainly would not have parted with it under any circumstances. He (Sir William) could never get any satisfaction from the dealers as to the manufacture of that spurious pedigree. The picture was at present in Boston, Mass., and was still offered as a genuine Harvey.

Dr. H. A. CLOWES remarked that William Clowes, the son of Banister's friend, was serjeant-surgeon to Charles I, and died in the year 1648. He (the speaker) possessed a copy of his will, made in 1639. Harvey and he sat upon a Commission together to inquire into charges of witchcraft. There appeared a poem at the end of one William Clowes's books which ran:—

"Deserving more than laurel bowes
Is the worthy work of William Clowes."

This suggested that the name was not pronounced "Clews" at that time.

Dr. MICHAEL FOSTER sent for exhibition two Italian diplomas. The first was granted to Augustin Rossi as a Doctor of the Canon and Civil Law. It is dated from Padua in the year 1714, and has the seal intact, and attached by the original cords. The second is a licence to practise surgery granted to Laurentius Maria Saura, and dated Venice, 1755.

Mr. D'ARCY POWER showed at the same time the facsimile reproduction of William Harvey's diploma of 1602 to prove how little change the form and language of the diplomas had undergone in the course of a hundred years in the Italian universities.

Section of the History of Medicine.

January 29, 1913.

Sir Wm. Osler, Bt., F.R.S., President of the Section, in the Chair.

Plague Banners.

By Raymond Crawfurd, M.D.

The custom of carrying sacred pictures in penitential processions, in times of pestilence, is one of some antiquity. If we may trust the tradition of the Church, which Jacobus de Voragine, Archbishop of Genoa, embodied in his Legenda Aurea at the end of the thirteenth century, it is at least as old as the time of Gregory the Great. Writing of that fierce outbreak of bubonic plague in Rome in 590 A.D., in which the pandemic of fifty years' duration discharged all its expiring virulence, the Archbishop says: "And because the mortality ceased not, he ordained a procession, in which he did do bear an image of our Lady, which, as is said, S. Luke the Evangelist made, which was a good painter, he had carved and painted it after the likeness of the glorious Virgin Mary. And anon the mortality ceased, and the air became pure and clear, and about the image was heard a voice of angels that sung this anthem:—

> "Regina coeli laetare : alleluia :
> Quia quem meruisti portare : alleluia :
> Resurrexit sicut dixit : alleluia :"

and S. Gregory put thereto:—

> "Ora pro nobis, Deum rogamus : alleluia."

At the same time S. Gregory saw an angel upon a castle, which made clean a sword all bloody, and put it into the sheath, and thereby S. Gregory understood that the pestilence of this mortality was passed, and after that it was called the Castle Angel (Castel S. Angelo)." The contemporary account of this famous procession by Gregory of Tours mentions neither picture nor vision, but we have other evidence of the carriage of sacred pictures at this time. Some of you may remember, among the many gems in which Bede's Ecclesiastical History abounds, that picture of the arrival of Augustine and his companions in Thanet "bearing a silver cross for their banner, and the image of our Lord and Saviour painted on a board." Those of you who know and love Kent may set the picture as you please, perhaps in some sheltered dip of the downs, as they sweep landward from the sea, perhaps beside some quiet steading, where orchards and smiling cornlands teem with the abundance of the coming harvest.

The Byzantine historian Theophylactus also describes two occasions, in 586 and 588 A.D., respectively, in which a sacred effigy of Christ, believed not to have been made by human hands, was carried into battle for the sake of inspiring valour and discipline into the soldiery.

The sixteenth century chronicler Baronius says that the picture which Gregory carried in this plague procession of 590 A.D. was that of the Madonna, now preserved in the Church of S. Maria Maggiore on the Esquiline, and still believed to protect Rome from plague and pestilence. Rome has no fewer than four pictures of the Madonna attributed like this one to the hand of Luke the Physician, and all of them reputed to have wonder-working powers. Expert opinion, alas! pronounces the oldest of them a fifteenth century production. Miraculous Madonnas abound in Italy, but are, as a rule, of little artistic interest. Florence has her Black Virgin in the small village of Impruneta. This dark panel, blackened and perished with the lapse of years, was found, so goes the legend, in the soil at Impruneta, and uttered a cry as the workman's spade struck it. Seldom or never exposed to the gaze of the devout, she has suffered the indignity of an exposure at the hands of the omnipresent photographer. In the great plague of 1527 the Commonwealth of Florence determined to have recourse to the Black Virgin of Impruneta, whom they had so often invoked with success in various crises of their history. So the Black Virgin was brought over the hills from Impruneta, and the magistrates of Florence, says Segni, "barefooted, and in mourning, received her at the gate of the city and carried her in solemn and very sad procession to the Church of the Servites. Forty thousand citizens had died in the month of November. But the never-failing Virgin of Impruneta prevailed on this occasion also, for with the coming of the cold weather the sickness began to abate." The Black Virgin still watches over Florence in time of drought. Readers of "Romola" will recall that other stirring procession of the Impruneta Virgin to the Duomo of Florence, in which Savonarola strode along defiantly among his company of black and white Dominicans. It was through these selfsame streets of Florence, at the latter end of the thirteenth century, that the populace carried aloft Cimabue's Madonna to the Church of S. Maria Novella, where it hangs to-day, in very joy that Art had awakened from her sleep of many centuries.

Still one more record of the carriage of pictures in these earlier years in time of plague. The scene is Constance, in 1414 A.D., during that council of prelates that condemned Huss to the stake. Plague had broken out fiercely, and they were about to disperse and fly from danger, when a young monk told them of the power of S. Roch. On his advice the council ordered an effigy of S. Roch to be carried in procession through the streets with prayers and litanies; and immediately the plague ceased. It was from this occasion that the cult of S. Roch, as protector against plague, became general in Central Europe.

In the Church of S. Pietro, in Vincoli at Rome, is a time-worn fresco, attributed to Pollajuolo (1429-98), which depicts in its essential features the description which Paul the Deacon has left of an outbreak of plague at Pavia. Paul says: "Many saw with their own eyes a good and a bad angel passing through the city by night. And whenever at the bidding of the good angel the bad one, who seemed to carry a lance in his hand, struck so many times with his lance on the door of each house, the same number of that household would die on the following day. Then it was revealed to someone that the plague would not cease until an altar was set up to Sebastian, Saint and Martyr, at the Church of S. Pietro in Vincoli. This was done, and as soon as the altar was set up the relics of the martyr saint were brought from Rome, and forthwith the plague ceased." This fancy of two conflicting demons originated in the religion of the Magians, was adopted from them by Mahomet, and passed from Arabia to Europe. Pollajuolo has transferred the scene that Paul described from Pavia to Rome, and added certain details of his own. In the background, at the summit of a flight of stairs, seemingly suggested by those of Ara Coeli, which were set up as a memorial of the Black Death, a citizen is telling to Pope Agatho, who is seated among his cardinals, his dream that the pestilence will not cease till the body of S. Sebastian is brought into the city (fig. 1). On the right the good angel indicates the condemned houses to the bad angel in the guise of the Evil One, who strikes on the door with his lance. On the left a procession is bringing in the relics, carrying a banner, on which the Madonna is depicted with robes spread out in protecting attitude. The foreground is strewn with bodies of the dead. In the sky the angel that spreads the pestilence hovers, bow in hand, discharging the arrows of pestilence.

This fancy of the protecting Madonna, spreading her robes over her suppliants, as a hen gathers her chickens under her wings, is borrowed from Hebrew poetry. It figures in a similar conception in the language of the ninety-first Psalm: "I will say unto the Lord, Thou art my hope and my stronghold: my God, in Him will I trust. For he shall deliver thee from the snare of the hunter, and from the noisome pestilence. He shall defend thee under his wings, and thou shalt be safe under his feathers." This plague of 680 A.D. depicted by Pollajuolo is a landmark in the history of plague, because it led to the veneration of S. Sebastian as a protector from all pestilence, as that of 1414 enthroned S. Roch as the patron saint of the plague-stricken.

These scattered allusions afford some information as to the genesis of the plague banners, or *gonfaloni* of Perugia. They serve at any rate to show a lineage far older than the epoch of the Perugian School of Painting, and one that extends also beyond the boundaries of Umbria. It is only in a limited sense that they can be regarded as exclusive products of the Umbrian School, and particularly of its Perugian branch. Indeed, we shall see that the two most famous had actually a Tuscan *provenance.* It so happened that the most fertile period of Perugian painting, in the latter half of the fifteenth century, coincided with the devastation of Perugia by a succession of epidemics of plague; and at each fresh outburst the painters of Perugia were called upon to produce these tributes of popular devotion. Before these suppliant banners marched the priesthood in their robes, behind them followed a penitent people, striking their breasts and wailing aloud "Misericordia." The remedy was well adapted to their sufferings, for these processions of penitents traversing the city and following banners that displayed the figure of the Redeemer, or the Madonna, or some plague saint, produced in their souls such a degree of spiritual exaltation as made despondency impossible. Men gazed on them as they gazed on the Brazen Serpent that Moses set up in the wilderness to stay the pestilence. A striking banner is that by Bonfigli, in the Church of S. Fiorenzo at Perugia, painted in 1476, during an epidemic of plague. Above kneels the Madonna; before her stands the Child in a basket of roses supported by angels, who are wearing chaplets of roses, as in most of Bonfigli's pictures. Both Madonna and Child are crowned. Below kneel groups of citizens, men

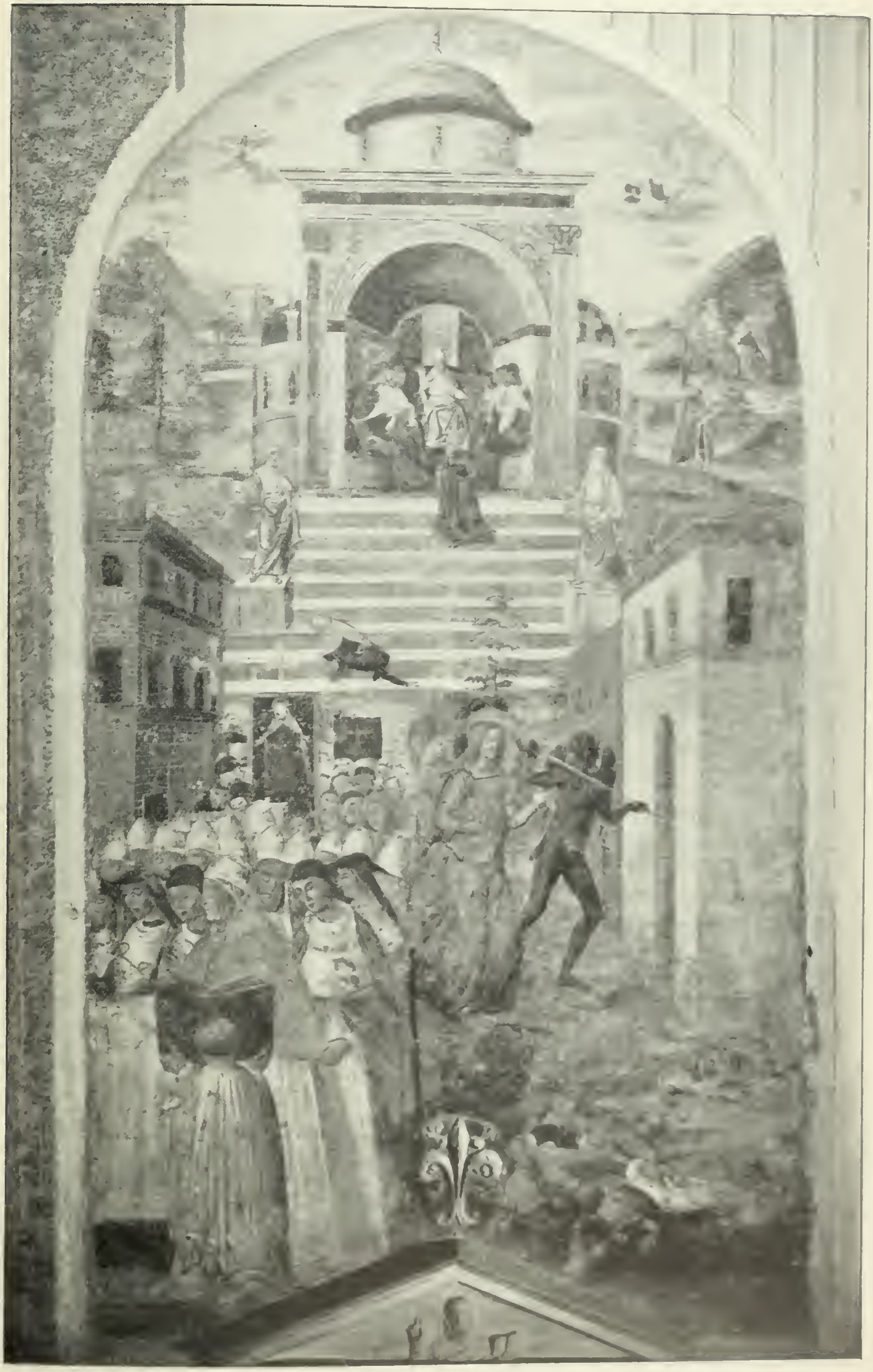


FIG. 1.

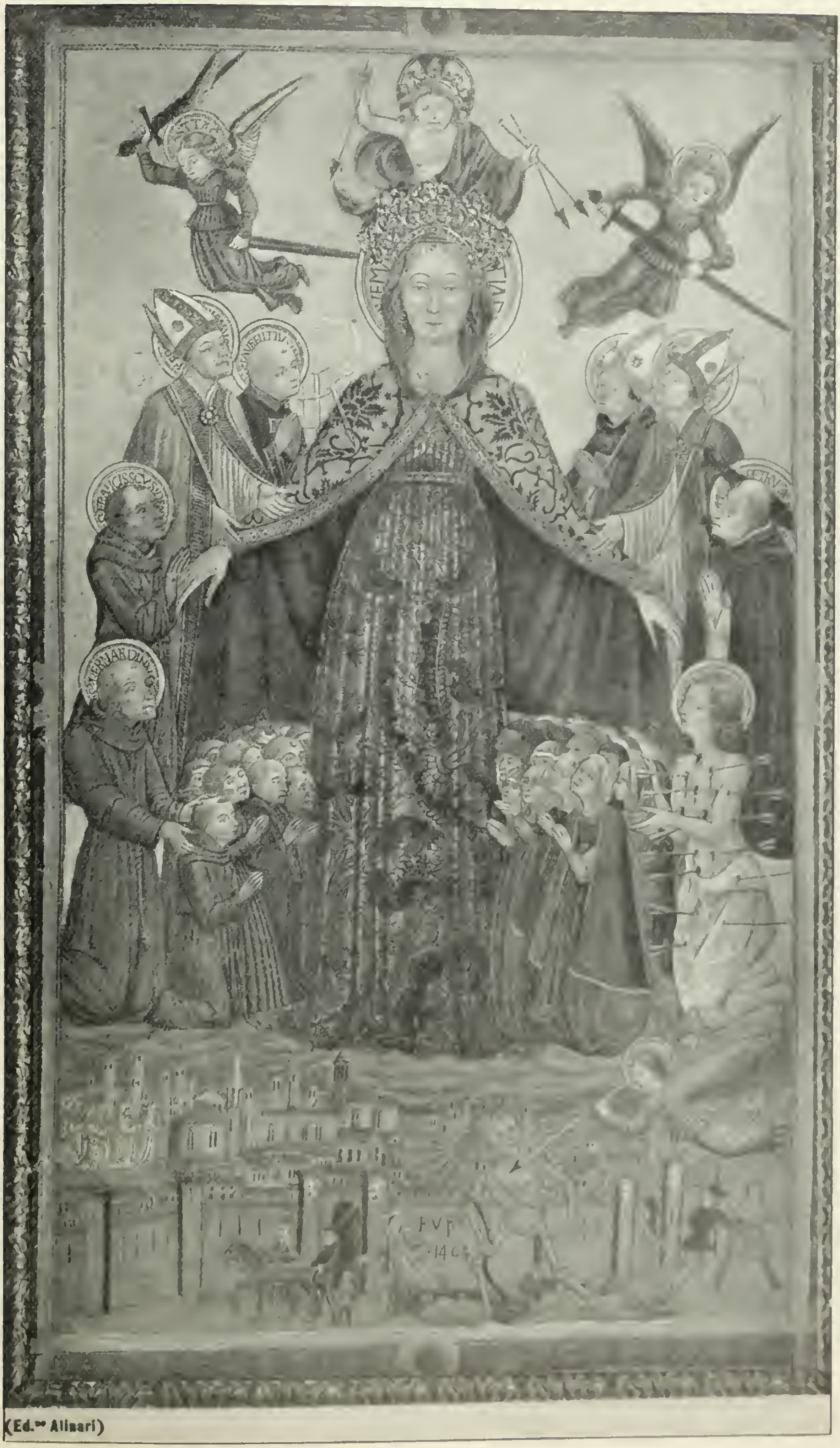
[Anderson, *Phot.*

and women, with Sebastian and other saints, supplicating the Madonna. An angel upholds a scroll on which is inscribed a fervid call to repentance, blended with fierce denunciation of their sins. This jeremiad in verse was composed by Lorenzo Spiriti, and runs:—

> "O popolo ostinato, iniquo e rio
> Crudel, superbo, ingrato e pien d' inganno, &c.,"

which has been anglicized, as follows, by Lina Duff-Gordon, in her "Story of Perugia": "Oh, most obstinate and wicked people—cruel, proud, and full of all iniquity, who have placed your faith and your desires on things which are full of a mortal misery, I, the angel of Heaven, am sent unto you from God to tell you that He will put an end to all your wounds and weeping, your ruin and your curse, through the mediation of Mary . . . Turn, turn, your eyes, most miserable mortals, to the great examples of the past and present, to the utter miseries and heavy evils, which Heaven sends to you, because of all your sins, your homicide and your adultery, your avarice and luxury. . . Oh miserable beings, the justice of Heaven works not in a hurry, but it punishes always, even as men deserve. . . Nineveh was a city florid and magnificent, and Babylon was likewise, but now they are nothing: and Sodom and Gomorrah, behold them now—a morass of sulphur and of fetid waters. . . Oh, therefore, be grateful and acknowledge the benefits and graces of our Saviour, and let your souls burn hotly with the fire of faith and charity, of hope and faithful love. . . But and if you should again grow slothful and unwilling to renounce your errors, I foretell a second judgment upon you, as I reckon that it will prove more terrible, more cruel than the first." In banners such as this, the imagination of the painter finds play for the crowding emotions not of his own heart only, but of the hearts of his fellow-citizens as well.

Another type of plague banner is Bonfigli's Madonna della Misericordia in the Church of S. Francisco del Prato at Perugia (fig. 2). It bears the date 1464. In the centre stands erect the majestic figure of the crowned Madonna. On her garment lie broken the arrows of pestilence, while beneath its ample folds kneel groups of monks and nuns in attitudes of prayer. Above, Christ, wearing both crown and cruciferous nimbus, casts arrows down. At His left hand is the angel of justice with sword drawn, at His right the angel of mercy with sheathed sword. Gathered around the Madonna and craving her intercession are S. Lorenzo and the Bishops SS. Severo, Costanzo, and Ludovico. Beneath these, to the right, SS. Francisco and Bernardino, and to the left S. Pietro (the



(Ed.ne Alinari)

FIG. 2.

Martyr) and S. Sebastiano, whose body is pierced with many arrows. These saints have Perugia in their special keeping. At the foot of the picture is the city of Perugia with its emblematic griffin on the wall. Within the walls a white-robed confraternity is kneeling in prayer. Outside lurks Death, a bat's-winged skeleton with bow and arrows, whose victims strew the ground. But the prayers have prevailed, and already the Archangel Raphael strikes Death with his spear. In the foreground outside the walls is a fugitive family, the mother mounted on a donkey carrying her infants in its panniers. At the side gate two soldiers make off in haste, as the porter tells them the state of the city. Perugians say that not Bonfigli, but an angel, painted the face of the Madonna. They might well have said it of the exquisite Madonna del Soccorso in Sinibaldo Ibi's plague banner of 1482, in the Church of S. Francisco at Montone.

One more Madonna banner calls for passing notice—that of Bonfigli at Corciano, near Perugia, dated 1472. It has the same general character as his Madonna della Misericordia. The quaint head-gear of the angels supporting her robe is the rose-wreath, symbolic of the Madonna, which appears, in one form or another, in so many of her pictures.

We pass now to a second type of plague banner, in which the figure of the Redeemer replaces that of the Madonna as the central theme. Such is Bonfigli's banner in the Church of S. Maria Nuova at Perugia (fig. 3). The figure of Christ, wearing a cruciferous nimbus, dominates the picture. He holds the arrows of pestilence ready to be launched among the people. His face is sad and regretful as he executes faithfully the behests of His Father. On either side of Him saints bear the emblems of the Passion, and to the right and left are the darkened sun and moon. Beside Him kneel the Madonna and the Franciscan S. Paulinus. In the lowest part of the picture are the chimneys and towers of Perugia, with the pest-fiend, in the semblance of a huge bat, bearing a scythe, and the angel of deliverance smiting him with his lance. Below, shepherded by S. Benedict and S. Scholastica, the diminutive citizens kneel in prayer. In nearly all these banners, as in other archaic works, the dwindling size of individual figures indicates the lesser parts they have to play.

The third type of plague banner is that in which the figure of a saint plays the leading rôle. The saint is always S. Sebastian, only because in Umbria and Tuscany he was the chief accredited protector against pestilence. The finest example of this type is the peerless masterpiece

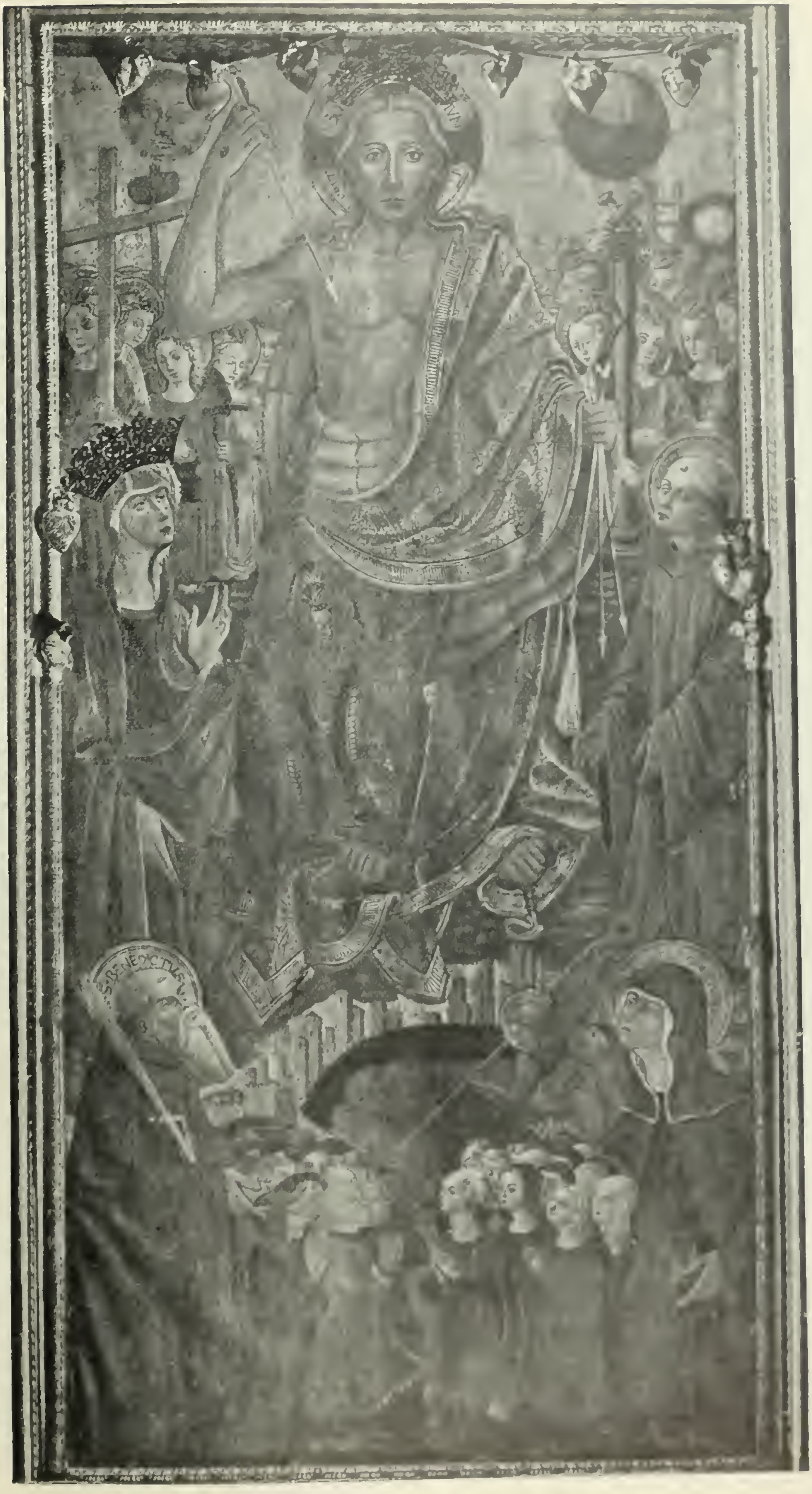


FIG. 3.

of Sodoma, now in the Uffizzi Gallery at Florence, one of the most beautiful creations of Renaissance art (fig. 4). It was painted in 1528 at Siena, for the Sienese Compagnia di S. Sebastiano in Camollia, and was carried in procession, whenever Siena was afflicted with pestilence. It was kept in the church of this confraternity at Siena, until it was removed to Florence in 1786. The undraped body of the saint is modelled on the lines of the youthful Apollo. He is bound to a tree in the foreground of a wild Italian landscape. His neck, side, and one thigh are transfixed with arrows. The upturned face wears an expression of ecstasy, in spite of suffering, as an angel descends to place the crown of martyrdom on his brow. The sublime pathos of the picture, inexpressible in words, unanalysable, haunts sense with a deep, abiding fascination. On the reverse of this banner is the Madonna with the Child in her arms, enthroned on clouds, above a kneeling group of SS. Roch and Sigismund and members of the Compagnia di S. Sebastiano, wearing the garments of their brotherhood. The work is much inferior to that of the face of the banner, and is said to be in part the work of Beccafumi (1486-1551). Brotherhoods such as this existed in most of the leading towns of Italy —that of the Misericordia in Florence, and of S. Rocco in Venice, for example—who devoted themselves gratuitously to the service of the sick and the carriage of the dead to burial. They may still be seen daily in the streets of Florence in the same long black cloaks as of old, and the same peaked hoods enveloping all the face but the eyes; content in the dignity of the work done, and careless of the identity of the worker.

Though martyred in 288 A.D., it was not till the plague of 680 that the cult of Sebastian, as protector from pestilence, became established. His association with pestilence was, as we have seen, in the first instance purely fortuitous. Devout men, in seasons of pestilence, were wont to acclaim their own peculiar patron saint as a very present help in time of trouble. An altar, a church, a votive picture, a procession, these, now one, now another, were the price of the promised dispensation. But what gave permanence to the cult of Sebastian was the association of arrows with his effigy, in commemoration of his first martyrdom, as plague has been symbolized from remote antiquity as "the arrow that flieth by day." It was Apollo among the Greeks who scattered pestilence with his bow, and who was invoked also by sacrifice and hymns of praise to avert it, and in Christian hagiology and art Sebastian is the counterpart of the pagan Apollo.

The greatest of all the plague banners was destined to be also the last: Raphael's Sistine Madonna, in which the Madonna and Child are

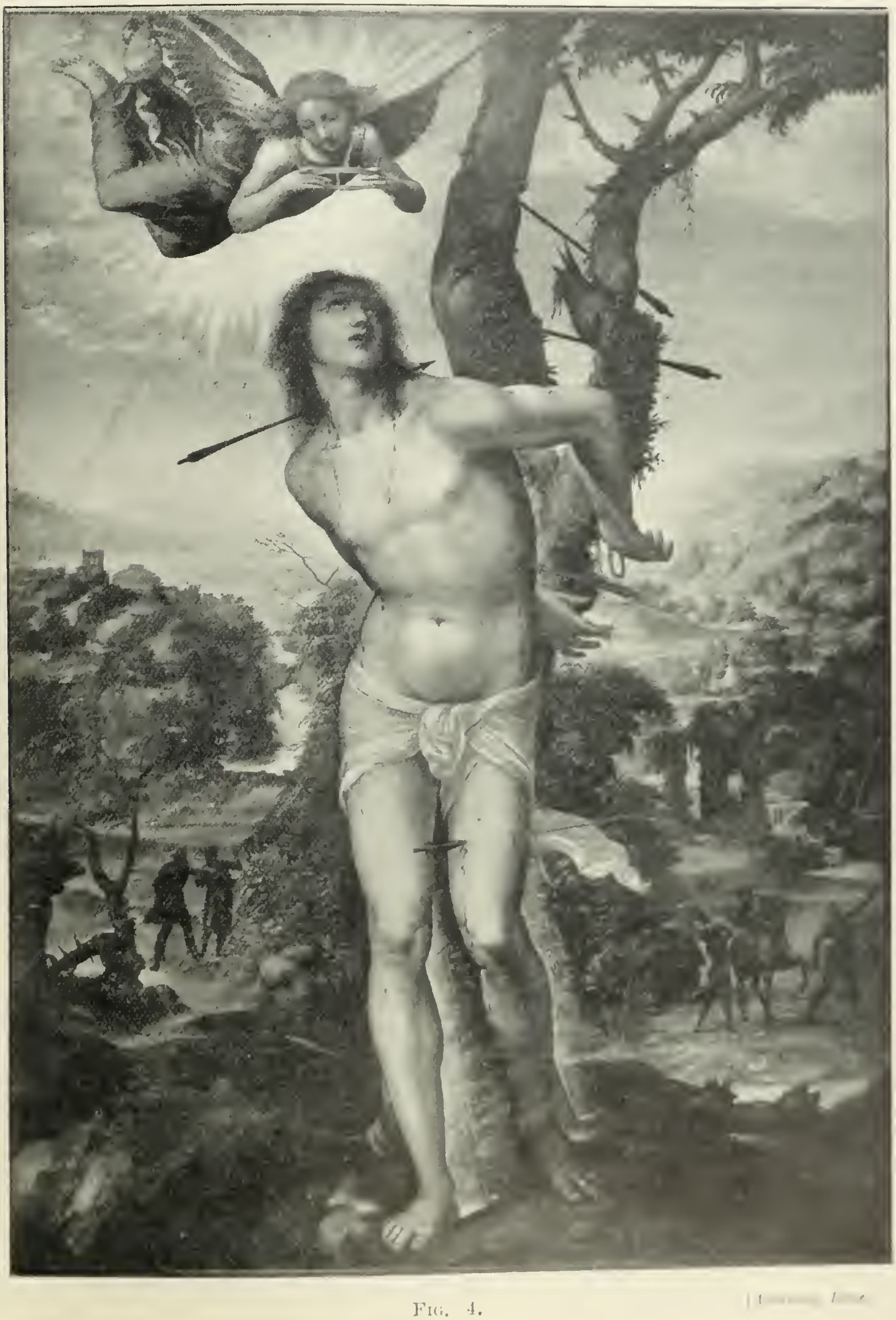


FIG. 4.

[illegible]

attended by S. Sixtus and S. Barbara, was painted during an epidemic of plague for the Black Friars of S. Sisto at Piacenza. No record exists that it was ever actually used for the purpose for which it was painted. Bonfigli, in the spirit of Phidias, had painted Mary the Queen of Heaven. Raphael, in the spirit of Praxiteles, had painted Mary the Mother of God. The people wanted a queen, and Raphael gave them a peasant woman. They could not see, as Raphael saw, in womanhood the embodiment of gentleness spiritualizing the brute in man. They could not see in motherhood the vision of willing suffering transfigured to joy. It was this reunion of Art with Nature that dethroned the plague banner from the affections of the common people.

Though not exclusively Perugian, nor even Umbrian, it is only in and around Perugia that these *gonfaloni* can be effectually studied. There they will be seen for the most part as framed altar-pieces in the various churches of the city and surrounding country.

Some Oddities in Nomenclature.

By B. Glanvill Corney, I.S.O.

Having occasion recently to refer to the "Chrónica geral do Brazil," by Dr. Alexandre José de Mello Moraes, for information about a certain Viceroy, I chanced upon some notes in which that author explains how the curious names given to three outbreaks of zymotic disease in the city and suburbs of Rio de Janeiro came to be bestowed.

The inaccessibility of records in the Portuguese language to many members of our profession in England must be my excuse for translating these short passages and offering them to the Section, in English. The "Chrónica" of Mello Moraes, revised by his son and published in 1886, is a work in two tomes: the first relates to occurrences between the years 1500 and 1700, the second deals with those of later date. The notes in questions are numbered 393 of 17th, and 26 and 823 of 18th; and are to the effect here rendered.

Note 393, of 17th.—"During the Government of D. Luiz de Vasconcellos e Souza as Viceroy, in the year 1777,[1] an epidemic of a pernicious character appeared in the city and suburbs of Rio de Janeiro—an ardent fever attacking the brain and spinal medulla, which, when it did not kill the patient, left him paralysed, and even with deformities. Its causes were not understood. The physicians and surgeons of the day employed various therapeutic means to combat the evil; but all were unavailing. Experimenters who used the *herva de bicho*[1] boiled and taken in the form of a ptisan, or administered in clysters, saved their patients.

---

[1] This figure is an error, perhaps a printer's. Vasconcellos only reached Brazil in March, 1779, and took over the government a week or so later. The epidemic really began in this latter year, but continued well into 1780.

"The Viceroy ordered tar to be burnt in the streets as a means of purifying the air.

"Among those attacked by this disorder was the famous painter, Leandro Joaquim, who, being left paralysed by it, invoked Our Lady of Peaceful Death, promising to paint her portrait if he should gain relief from his affliction. And in fact he did on his recovery execute a picture representing the Lady of Peaceful Death, which is preserved above the altar of the sacristy in the chapel of her hospice.

"The people gave to this epidemic the name *Zamporinion*, after one Zamparina, a Venetian singer who, having arrived at Lisbon in 1770 (as is well known from the records of the apostolic nuncio's chancery), came on to Rio de Janeiro about the time in question.

"As she had a very fine touch, and sang admirably well, she was much in vogue at the period of this epidemic—which coincided, as it were, with her appearance on the scene—and thus it got the same name as the singer Zamporine."[2]

Dr. Sigaud mentions this name for it, in his volume on the Climate and Diseases of Brazil,[3] and attributes the epidemic to influenza; but he refers it correctly to the year 1780, instead of 1777 as stated by Mello Moraes. Writing of it as "la grippe," Sigaud observes:—

---

[1] *Herva de bicho*—lit. "worm-grass" (but not the Spigelia so named)—is described by r. Carl von Martius, the distinguished botanist, in his "Reise in Brazilien," as a smooth-emmed herbaceous plant of the *Polygonaceous* order, much in request in Brazil for employ-ient as a fomentation or cataplasm in cases of arthritis, and also of hæmorrhoids, and in he early stages of *doença do bicho*. This polygonum, called by Martius *antihæmorrhoidale*, is not mentioned in Marcgrav's "Historia Plantarum." For a full botanical description of the plant see, however, Endlicher and Martius's "Flora Braziliensis," fascic. xiv, part 1. *Doença do bicho* or "worm disease" is described by Piso in his "De Medicina Brasiliensi," (1648), as a severe irritation of the rectum to which negroes, particularly new-comers from Africa, are or were considered especially susceptible. It was sometimes termed *bicho de culo* or "stool-worm," and was thought to be caused by some helminth which gained access to the intestine *per anum*. It seems not unlikely that the employment of some cleansing material culled from the "bush" by the slaves, and different from that used by the native Indians, may have conduced to contagion by that means.

[2] The variants in the spelling of this name are here copied *literatim*.

[3] "Du Climat et des Maladies du Brésil," par J. F. X. Sigaud, Par., 1844.

"Cette année elle fut d'une intensité marquée, mais il est essentiel de noter qu'elle conservait chaque année une physiognomie particulière. Dans le rapport du docteur Maia, présenté a l'Académie impériale de Médecine de Rio de Janeiro, il est dit que parfois la maladie prit un caractère malin et funeste. Elle regna en 1780, et cette fois elle causait une grande altération du système nerveux et locomoteur; elle reçut alors le nom de *zamparina*."

Neither 1777 nor 1779 was a notable influenza year in Europe; nor was 1780, as Sigaud puts it. The influenza years at home about that time were the winter of 1775-76, and next 1782. But influenza continued to spread by degrees in other parts of the world; and it is easily conceivable that, with the slow voyages customarily made by sailing vessels, some belated cases may have reached Rio de Janeiro from other places in South America or elsewhere, in either of the years mentioned.

The brief indications afforded by Mello Moraes of the characteristics of this affection nick-named *zamporinion* seem rather suggestive of cerebrospinal meningitis, and it is, naturally, possible that cases of that scourge existed concurrently with epidemic influenza.

What can be more significant than the "ardent fever, attacking the brain and spinal medulla, which, when it did not kill the patient, left him paralysed and even with deformities"? Even the fact that "its causes were not understood" helps to bring it into line with cerebrospinal meningitis of more recent experience, and one might say the same of the "various" yet "unavailing therapeutic means" employed by our bygone colleagues "to combat the evil," much as we have witnessed the failure of such measures in our own day. Sigaud's allusion to the "système locomoteur" being affected might seem to support the same view; but though the alternative title to his volume is "Statistique médicale," he gives no mortality returns of *zamporinion*, unfortunately, and these would have been a good criterion to judge the question by. We all know what freaks and phases influenza is apt to exhibit at the sundry periods of its recurrence, and Sigaud's remarks above quoted follow on his descriptions of earlier visitations and varying types of that disease at Rio. Hence it is that he draws the distinction that "cette fois" a new train of symptoms arose, and even a new popular name was assigned to the epidemic: one more whimsical, if forsooth less apt, than our curiously warm-hearted English designations from time to time bestowed on influenza, such as (in 1580) the "gentle correction," (in 1675) the "jolly rant," and (in 1678-79) the "new delight"[1]—names which the racket and bustle of modern life seem finally to have elbowed out of remembrance in favour of a now familiar scrimped up barbarism which, since 1890-91, has become a household word; but which, saving your presence, gentlemen, I forbear to pronounce within these walls.

On the whole, perhaps, we should give the Brazilians the credit of having correctly diagnosed their own epidemic, and, therefore, I refrain from arguing a new theory about it; merely throwing out as a suggestion the view that cerebrospinal meningitis might account for the symptoms enumerated by Mello Moraes, and dubbed by the gay Rio people *zamporinion*, in compliment to the Venetian singer-lady Zamparina, whose warblings served to distract their attention from its terrors.

There is just one other point to touch upon, which is this. Measles is called in Portuguese *sarampão*, and in Spanish *sarampion*. Both are pronounced very much alike (save that the former termination carries a nasal sound), and are plausibly suggestive of etymological affinity with such a word as *zamporinion*. Excepting in sound, however, there is not really anything in common between them, the term for measles being directly derived from the Greek word *ξηραμπέλινος*, in allusion to the notable coloration of the rash, which is thus fancifully likened to the rufous tints of sear and withered vine-leaves familiar to all who dwell in the South of Europe.

The next note in Mello Moraes's "Chrónica" to record an epidemic is the following:—

Note 26 of 18^{00}.—"There appeared in Rio de Janeiro in the course of the years 1802 and 1803 a catarrhal epidemic with fever so high, and cough so similar to whooping-cough, that the persons affected by it finished by being doubled up with its violence. So that, in consequence of the bent condition in which it left them, people gave to it the name *corcunda*."

Corcunda, or *carcunda*, means in Portuguese a hump, or hunch; as an adjective it is applied to hunchbacks, being cognate with the verb *corcovar*, whence *corcovado*, "bent" or "hunchbacked." This epidemic was probably one of influenza also, but of the bronchial and pneumonic type rather than neural. Finckler[2] records the prevalence of influenza at Rio in the years mentioned, but does not name his authority.

---

[1] "A History of Epidemics in Britain," by Charles Creighton, M.A., M.D.Camb., 1894.

[2] "Twentieth Century Practice," Lond., 1905, vol. xv, art. "Influenza."

Creighton[1] quotes 1803 as a remarkable influenza year in the British Isles. Of course, there may have been a prevalence of whooping-cough at the same time. In oversea countries where zymotic diseases used, in the days of sailing ship communication, to gain entry at comparatively long intervals, elderly persons were wont to suffer from it, not only very severely, but in considerable numbers. But that this particular *corcunda* was catarrhal influenza seems quite a tenable belief, for it may easily have been accompanied by cough of a paroxysmal character, which would deplete the lungs of air, whereby the chest-walls would tend to collapse, causing the patient to stoop so as to "finish by being doubled up with its violence." We are all familiar with the racking nature of the expiratory spasm in influenza; and "even in the earliest recorded epidemics special mention is made of the spasmodic character of the cough," says Finckler.[2] Short, writing in 1510, and quoted by Leichtenstern, described the cough as approaching to suffocation, and alleged that the term *coqueluche* was first applied to influenza in the epidemic of that year: but Lobineau assigns this name as early as 1414 to the epidemic of that date, better known in France as *le tac*. Pasquier,[3] the lawyer, refers the origin of *coqueluche* to the epidemic of 1403, which he describes, and observes that it was revived in 1557 when he himself was a sufferer from the pan-European catarrhal fever which then occurred and is very amply recorded. *Coqueluche* is a derivative of *coqueluchon*, a cowl or hood, in allusion to the patients' habit of muffling up their heads and necks when suffering from influenza cough, and sensitive to chill. *Coqueluchon* is an adaptation from the Italian form, itself a mediæval expansion of *cucullus*.

Of *le tac* Pasquier says that it came into vogue in 1411, and that the fever was accompanied or succeeded by a cough so violent that "men became ruptured about their genitals," and there were instances of pregnant women in whom it caused premature delivery. He adds that it was of so universal and prostrating a nature that people used to mock one another on the subject; and it even became a common imprecation to wish your enemy might be stricken with *le tac;* much as Shakespeare, in "Measure for Measure," makes Lucio apostrophize the Duke disguised as a friar:—

> "Why, you bald-pated, lying rascal! you must be hooded, must you?
> Show your knave's visage, with a pox to you!"

---

[1] Op. cit.

[2] Op. cit.

[3] "Les Recherches de la France," par Estienne Pasquier, Par., 1665.

The same author quotes another epidemic, from a writer he does not name, as occurring in 1427 and known as *Ladendo,* or *la dendo*—a word which tempts one to wonder whether it can have had anything to do with the terms "dandy" or "dengue," whose derivation and exact philological meaning no one seems yet to have satisfactorily traced.

The next note I transcribe, and with which I propose to close this short sketch, relates to dengue; it deals with the third and last epidemic recorded by Mello Moraes, and explains the quaint and inconsequent application of the term *polka* to this exanthem:—

Note 823 of 18^{00}.—"In the year 1847 an epidemic sickness arose to which, in Rio de Janeiro, the people gave the name *polka,* by way of commemorating a beautiful and highly fashionable young lady then at Court. This illness attacked the in'ards and the articulations; and did not often prove fatal."

The meaning of the word *polka* is, of course, "Polish," "of Poland," but as to who this Polish young Court beauty was, or how and why she chanced to be in Brazil, Mello Moraes is silent. Nor does it seem clear—*muito bonita* as she is declared to have been—why she should bequeath her name or nationality to any fever, save of admiration; for she could not be accused of "attacking the in'ards" (unless it might be the heart) nor the joints.

"Polka," however, is quoted in several works on medicine as one of the many by-names for dengue; and I myself first met with it in actual use, from the mouth of a junior colleague, during an epidemic of dengue we experienced in the Fiji Islands in 1885.

It is further stated, in Mello Moraes the younger's revision of his father's book, that the 1847 visitation of dengue extended over most parts of Brazil; and that at Bahia it was called *rabo aberto,* because of a glut in the market (of a fish of that name) which occurred at the time of its prevalence.

Portrait of Humphrie Lloyd.

MR. J. Y. W. MACALISTER showed a water-colour portrait of Humphrie Lloyd or "Llwyd" who translated the "Treasury of Health," written by Pope John XXI, and published in 1585. Lloyd was a physician and antiquary, born at Denbigh in 1527, and dying in 1568 on his way home from London, he was buried in his native town.

A Demonstration of some Eighteenth Century Obstetric Forceps.

By ALBAN DORAN, F.R.C.S.

THE three obstetric forceps which I exhibit to-day are all representatives of old types of instrument in use in the eighteenth century, but long obsolete. The first and second were formerly included in the collection belonging to the Obstetrical Society of London and are now in the Museum of the Royal College of Surgeons of England as a loan from the Royal Society of Medicine, with which the Obstetrical Society was amalgamated. The third was presented to the College Museum by Dr. Clement Dukes.

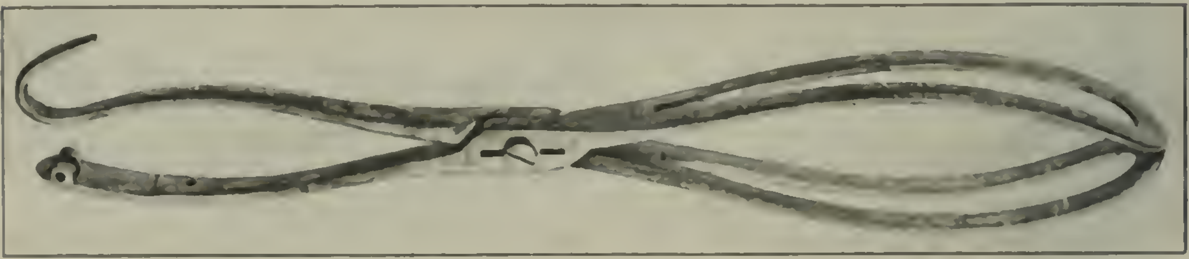


FIG. 1.

Grégoire's forceps, fitted with hinge for Freke's sharp crotchet. Loan Collection, Museum of the Royal College of Surgeons.

GRÉGOIRE'S FORCEPS.

This first instrument to which I shall turn your notice this afternoon (fig. 1) is a good sample of a French forceps in general use before Levret devised the pelvic curve, independently, it seems, of Pugh and Smellie. It is of the type of the instrument which was designed by Grégoire fils. It differs from the Grégoire forceps represented in Mulder's standard work[1] in that the blades are much straighter and the lock is far less complicated, whilst the handle of one blade was furnished with a crotchet. In this sample the appended crotchet has been lost, but in another preserved in the Obstetrical Museum of the University of Edinburgh (fig. 2) it remains intact, as seen in these photographs prepared for me by Dr. R. W. Johnstone. Freke, Surgeon to St. Bartholomew's Hospital, devised a similar crotchet arrangement, figured in a drawing of his forceps in Giffard's work, edited by Hody and published in 1734, without any detailed description. I have failed to find any other record of Freke's forceps after careful search and consultation with Sir W. Church and Dr. Norman Moore, who have traced many of Freke's surgical writings. The crotchet was formed by the handle turned inwards and bifurcated, and was covered in, when not required, by a guard, a flat, oval piece of metal attached to a pivot on the inner side of the handle. In this modified Grégoire's forceps the mechanism is different. There is, as you can see, a hinge on the extremity of the handle, turned inwards. The crotchet was a separate piece of metal, bifurcated at its free end and attached at its opposite extremity to the hinge, as the photographs from Edinburgh teach us (figs. 2, 5, and 6). There was an oval metal guard, as in Freke's forceps, but it was slightly concave, and arranged so as to fix the crotchet when required or to cover it in against the inner side of the handle when it was not wanted. This arrangement would seem to be an improvement on Freke's device, adapted to a French instrument. Yet it is possible that it is an original idea of Grégoire's which Freke simplified and adapted to an English forceps.

---

[1] "Historia Litteraria et Critica Forcipum et Vectium Obstetriciorum,' Leyden, 1794.

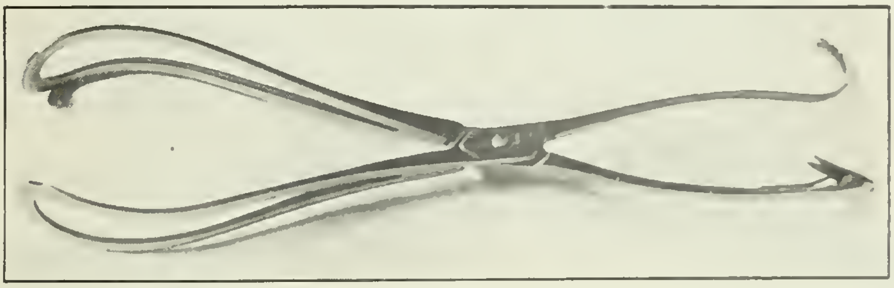


Fig. 2.

Grégoire's forceps, showing the sharp crotchet. Obstetrical Collection, Museum of the University, Edinburgh. Photographed by Dr. R. W. Johnstone. (Much reduced.)

We cannot, as far as the literature of the time can indicate, feel certain that Grégoire, jun., himself did not devise or suggest this modification of his original instrument. He never published any work on his own forceps, but was saved from oblivion, indeed made famous, by Adolphus Boehmer, who had studied under Manningham, famous as the detector of the imposture of Mary Toft, the rabbit-breeding woman. Boehmer translated Manningham's work into Latin, the title being "Artis Obstetricariae Compendium tam Theoriam quam Praxin," and it was published at Halle in 1746. Boehmer described and figured Grégoire's forceps in an appendix. A copy of Boehmer's work is preserved in the Library of the Royal Society of Medicine, but the drawing of Grégoire's forceps has been torn out. However, Mulder figures it (loc. cit., pl. ii, figs. 7 to 13), figs. 8 to 12 being devoted to the complicated lock. Kilian ("Armamentarium Lucinae Novum," 1856, pt. xiv, fig. 5) publishes one drawing of Grégoire's forceps with a lock much less complicated. A pivot projecting from the lower blade passes through a hole in the upper. This arrangement is also present in the Edinburgh Grégoire's forceps, as seen in the photograph (fig. 4—fig. 3 representing the lock in the instrument now exhibited). Dr. Hellier has described and figured a Grégoire forceps belonging to the Museum of the University of Leeds[1]; the lock is of the same type and there is a sliding bolt which fits into a groove round the neck of the pivot and grasps it firmly. The pivot mechanism is also seen in the modified Dusée's forceps,[2] preserved in the Mulder Collection at Utrecht, and in

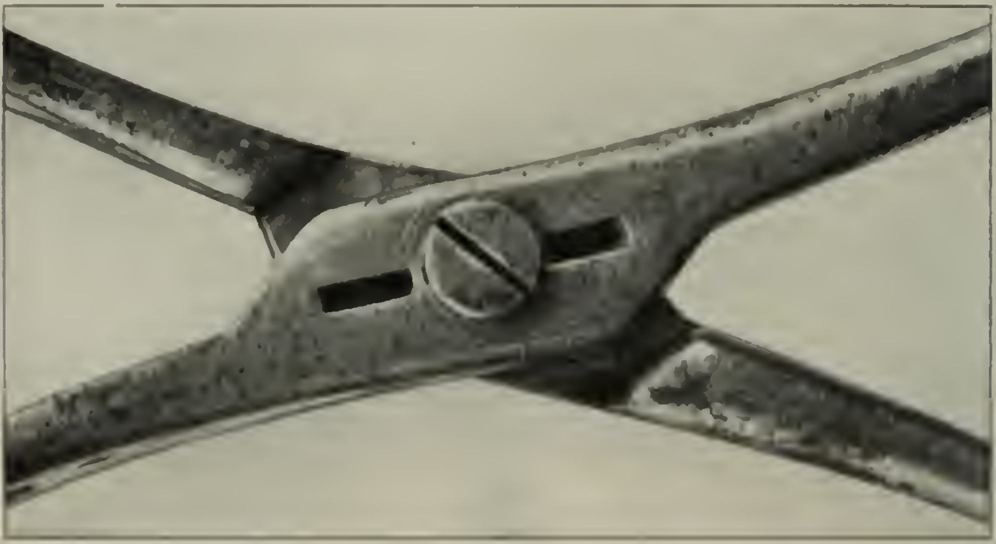


FIG. 3.

Grégoire's forceps, showing two slots divided transversely; the screw has been fixed just below the metal crossing between them. Loan Collection, Museum of the Royal College of Surgeons.

---

[1] "A Pair of Midwifery Forceps of Early Eighteenth Century Pattern," *Brit. Med. Journ.*, 1912, i, p. 1027. The handles are both curved outwards as in the original, and there is no arrangement for a sharp crotchet.

[2] This instrument and Burton's forceps are figured in an article on "Burton ('Dr. Slop'), his Forceps and his Foes," *Journ. of Obstet. and Gyn. of Brit. Emp.*, 1913, xxiii, pp. 3-24.

the forceps preserved in the Library of the York Medical Society, and used by Dr. Burton ("Dr. Slop" in "Tristram Shandy") in his practice, though quite different from the instrument which he invented.

In Mulder's "Historia," the most trustworthy of the earlier illustrated works on forceps, the earliest invented instrument with the pivot arrangement is Petit's (pl. iv, fig. 9), an instrument otherwise differing greatly from Grégoire's, whilst the first where it is clearly identical with the pivot lock seen in the Edinburgh forceps is Péan's (pl. vii, p. 18); the inventor Péan, not to be confounded with the gynæcologist who flourished at the end of the nineteenth century, was an eighteenth century obstetrician whose forceps was first ascribed to Baudelocque, sen., father of the inventor of a well-known cephalotribe. The former, according to Mulder, admitted Péan's priority. Coutouly (pl. x, fig. 1) also preferred a similar lock, Kilian ("Armamentarium," pl. xvii) representing it plainly. But it is significant that Kilian, who lived long after Mulder, represents Grégoire's forceps with the pivot just as in the Edinburgh forceps, whilst Mulder ("Historia," pl. ii, figs. 7 to 13) figures an absurdly complicated lock in his drawings of Grégoire's forceps (loc. cit., pl. ii, figs. 8 to 12).

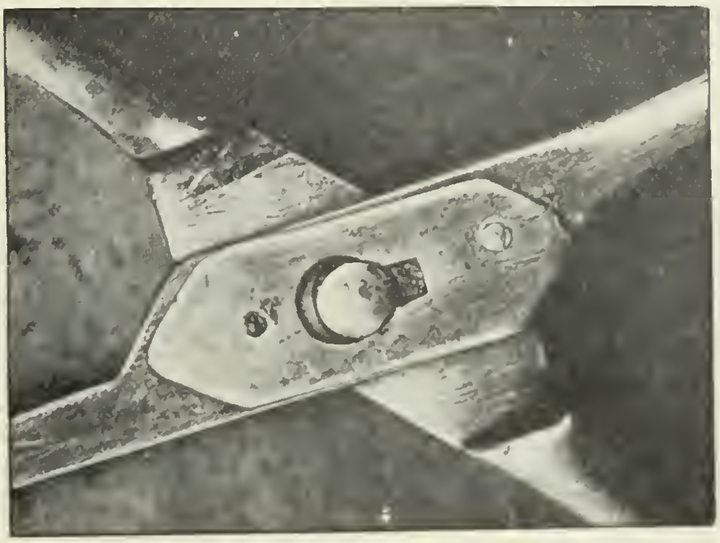


Fig. 4.

Grégoire's forceps. Obstetrical Collection, Museum of the University, Edinburgh.

It will be noted at a glance that the screw arrangement (fig. 3) in the lock of the modified Grégoire's forceps which I show is even simpler than the pivot in the Edinburgh sample (fig. 4). A plain screw is fitted into a slotted joint which allows of radial deviation; two slots are seen in fig. 3, the lower separated from the upper by a narrow bar of metal, and the screw in the photograph has been fixed in the lower slot—namely, that towards the handle—an arrangement which suggests Dusée's forceps with two locks.[1] As the screw bears no thumb-piece, a screwdriver must have been employed in order to fix or remove it.

These variations in the lock of several forceps of the Grégoire type suggest that it was soon found to be much too clumsy, as devised in Grégoire's original instrument. Hence arose the adoption of simpler locks, as seen in this and the Edinburgh instrument, where a sharp crotchet arrangement is added to one handle. Possibly Grégoire himself simplified the lock. We only know of his original forceps through Boehmer, so Grégoire might have altered it after his German pupil had ended his pupilage.

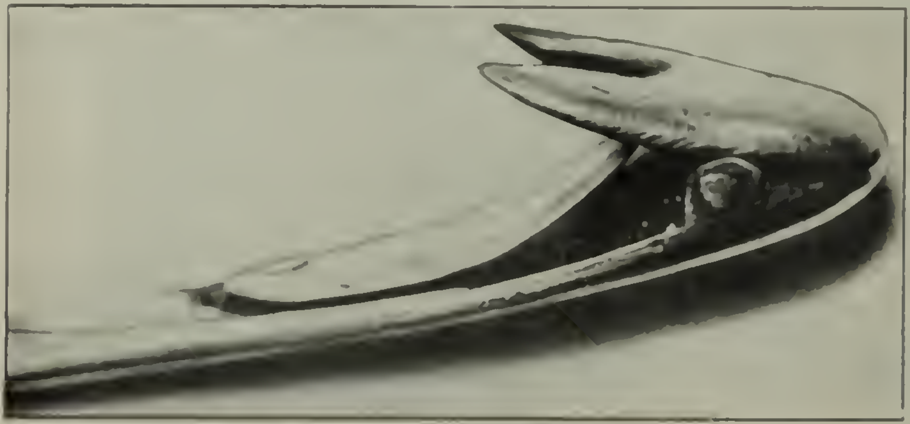


Fig. 5.

Sharp crotchet, ready for use (on No. 2).

The handle of one blade is less convex outwards in this instrument than in the typical Grégoire's forceps. The blades are very long, 8½ in. (21·5 cm.), measuring with the handles 1 ft. 5 in. (43·2 cm.),[2] the curve is wide, the extremities, 1¾ in. (4·4 cm.) in breadth and broader than the bases, are not curved abruptly inwards as in Mulder's drawing. The fenestræ measure in length 7½ in. (19 cm.), and, as in the instrument drawn by Mulder, are cut square near the lock, ¼ in. (0·6 cm.) wide, not ending in a point as usual; perhaps this was done to lighten the very heavy instrument as much as possible. The greatest space between the closed blades is $2\frac{3}{8}$ in. (6 cm.), whilst at their extremities they almost touch, as in Smellie's forceps. Mulder gives a space of $1\frac{1}{4}$ in. to his Grégoire's forceps. The compressive power of this instrument, which weighs 1 lb. 9 oz. (702 grm.), must have been dangerously strong.[1]

---

[1] *See* "Dusée: His Forceps and his Contemporaries," *Journ. of Obstet. and Gyn. of Brit. Emp.*, 1912, xxii, p. 119, and "Dusée, De Wind, and Smellie," *ibid.*, p. 203.

[2] Mulder makes out the length of the whole instrument as "15 pol."; of the blades, "8½ pol."

We may dismiss this forceps as a most inconvenient instrument, which was soon discarded when Levret invented his own with the pelvic curve. It must have been more awkward than Dusée's, which Smellie himself once made use of, on Butter's recommendation, and rejected, devising the pelvic curve and the long forceps. Levret almost simultaneously introduced the pelvic curve, yet his forceps was as long, if not longer, than Grégoire's.[2] The French obstetricians believed in a strong, long-handled forceps. British obstetricians, on the other hand, dreaded unduly the risks of pressure of the fœtal head and of damage to the soft parts of the pelvis through friction or slipping of the blades. Hence it will be instructive to compare this modified Grégoire's forceps with the two English eighteenth century instruments which I will now exhibit.

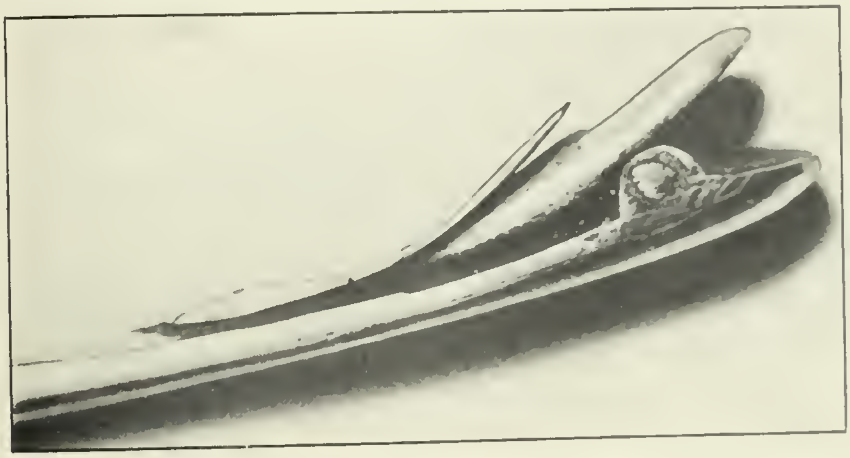


FIG. 6.

The same, closed and covered by guard.

---

[1] Dr. Cordes, of Geneva, possesses a Levret's forceps which weighs 870 grm.; it is of the same length as the Grégoire's forceps which I exhibit (17 in.), "Midwifery Forceps of Early Eighteenth Century Pattern," *Brit. Med. Journ.*, 1912, i, p. 1276.

[2] According to Mulder's tables, Levret's followers constructed forceps just as long—Petit's, 15 in.; Coutouly's first pattern, $16\frac{1}{2}$ in.; Péan-Baudelocque, $17\frac{1}{2}$ in., longer even than the forceps here exhibited.

ORME-LOWDER FORCEPS.

The second instrument (fig. 7) which I exhibit this evening is also from the collection once belonging to the Obstetrical Society of London. It bears the label: "Short forceps belonging to Dr. William Ralfs, in use before 1815. Presented by his grandson, Dr. W. A. Bonney." It is of the Orme-Lowder-Haighton type, a straight and very short forceps with broad blades narrowing at the free ends, which lie far apart when the handles are closed. Its weight is 11 oz. or 312 grm. Dr. F. W. Cock informs me in a letter: "I remember my father telling me how he delivered a woman with a pair of Lowder's forceps in 1854 for a country doctor, and what a good hold they had of the child's head, unlike Denman's, which used to slip. The country doctor's predecessor, a very old man, was a Guy's or Thomas's student, and the Lowder forceps had been left 'in the practice.'"[1]

I take this opportunity of laying before you certain passages collected from the writings of Lowder, Haighton, and their pupils, as there is some obscurity about the relation of these obstetricians to their instruments; whilst Orme, who, it will be seen, devised the original type, appears to have left no writings, the witnesses of his priority being a German and a Dutchman, just as the forceps of Dusée, a Frenchman, was made known not by himself, but by a Scotchman.[2]

Lowder speaks for himself. In a manuscript copy of his lectures on the "Theory and Practice of Midwifery," dated 1782, and preserved in the Library of the Royal Society of Medicine, the following statement is to be found: "Dr. Orme thought he could improve on Dr. Smellie by shortening the forceps further, making the blades rounder and wider towards the lock to suit the parietal bones. I thought they might be improved by locking lower down in the handle to avoid pinching the mother, but when I came to use them I found they required more force to hold them together, that what I gained one way I lost on another." A plain statement, but Lowder says no more about these forceps. He implies that Orme's modification preceded his own, and the evidence of foreign obstetricians of his day confirms the precedence of Orme. In 1783, a year after Lowder wrote the manuscript lectures, Carl Gottlob Kühn described Orme's forceps in a thesis, which was reprinted in 1827 with his other works, as the "Opuscula Academica Medica et Philologica," a copy of which is preserved in the Library of the College of Surgeons. "Smellie's forceps was modified by Orme, Surgeon to Guy's Hospital, and *a Lowthero* (*sic*), the highly experienced obstetrician of the same hospital" ("De forcipe, Ormii," loc. cit., i, p. 113). Kühn, as will be explained, was not accurate as to the appointments of the two obstetricians. He states that he is not sure when the instrument was invented, nor whether the honour is to be accorded to Orme alone, or to Lowder as well.[1] Kühn describes Smellie's short forceps and Orme's forceps at great length, and figures them side by side. He dwells on the broad blades of Orme's instrument with the wide fenestræ, which, like the blades, are narrowest at the extremity, and the wide parting of the shanks above the lock (Blundell, the follower of Haighton, the successor of Lowder, we shall see, finds fault with the fenestræ as being too *narrow*). Smellie's forceps, Kühn states, has narrower blades with narrow fenestræ, widest at extremity, and the shanks do not diverge widely above the lock. When the handles are closed the extremities of Orme's blades are $1\frac{5}{8}$ in. (4·12 cm.) apart, precisely as in the forceps now exhibited, though Mulder gives a different measurement, 1 in. Kühn concludes: "Nolo jam ex his, quæ breviter de Ormianae forcipis incommodis disserui, colligere quasi animi mei hac de forcipis Smellianae immutatione sententiam. Etenim lucide apparere puto me non tantopere captum esse novitatis amore, ut vere emmendatam, et ad majorem perfectionis gradum evectam *Ormii* studiis forcipem fuisse censeam."

---

[1] Although the Osborn forceps which I show to-day looks light, it weighs almost exactly the same as this Orme-Lowder forceps (11 oz., or 312 grm.).

[2] *See* author, *Journ. of Obstet. and Gyn. of Brit. Emp.*, loc. cit., p. 122.

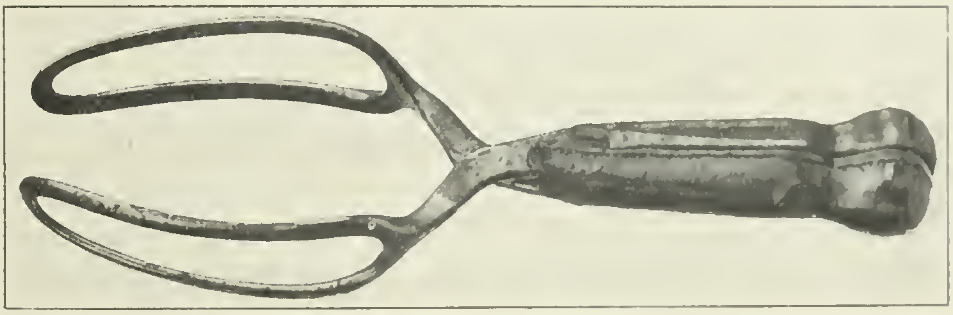


FIG. 7.

Orme-Lowder forceps. Loan Collection, Museum of the Royal College of Surgeons.

Perhaps the most important witness as to the development of the

---

[1] Mulder, it will be shown, wrote in 1794 that Lowder's forceps had not then been described in print, admitting that Kuhn had described Orme's very correctly.

Orme-Lowder type of forceps is Mulder. I therefore quote in full the experience of this authority, who was a pupil of both these obstetricians. The passage is from the "Historia Forcipum et Vectium," 1794, p. 66; and is also to be found in Schlegel's translation, "Geschichte der Zangen und Hebel," 1798, p. 80. A copy of the German edition is preserved in the Library of the Royal Society of Medicine; it was formerly in the possession of Dr. Rigby, and against the reference to Kühn, 1783, quoted below, there is a pencil mark, "my MS. copy of Lowder's lectures is 1776," an important piece of evidence showing that the forceps is of older date than we might otherwise suppose. Mulder's evidence is written out clearly.

"I will now relate in chronological order what several English authorities have contributed towards the improvement of the forceps.

"First I must mention David Orme and William Lowder, who are both obstetricians in London,[1] and were my teachers when in past years I was residing there. They had made use of forceps already for several years different from any previously included in my collection. They have neither described their own instruments nor had them drawn, but in the year 1783 Karl Gottlob Kühn published a description of the first—namely, Orme's forceps—and as far as I know is the first person who ever reported the instrument in print. [In a footnote Mulder refers to Kühn's thesis and considers that the description is very correct, but the drawing poor.] As chronological order is strictly followed in this "Historia," I must place this forceps first. Lowder's forceps, which has not yet been reported or figured, I will proceed to describe on account of its resemblance to Orme's, of which it is only a variety, though, according to the time when it was invented,[2] it should not be placed immediately after the former. Orme's forceps consists of two blades which have not the new (pelvic) curve, but are straight. The blades have fenestræ, and besides being not so long, differ from Smellie's in that they are broader at the base and narrower at the tip; whilst the latter run each from a narrow base to a broad free end. Again, the angle of divergence of the blades is greater in Orme's forceps, and the ends, which in Smellie's come close to each other, are an inch apart (when the handles are closed). The lock and the handles resemble

---

[1] Mulder, let it be noted, makes no mention of Guy's Hospital in reference to Orme or Lowder.

[2] Unfortunately, Mulder does not give the precise dates of the introduction of Orme's forceps and Lowder's, nor even state how many years the latter came into use after the former.

Smellie's. [Mulder adds in a footnote that Kühn is correct about these distinctions, as he has authenticated them by inspection of a genuine Orme's forceps in his own (Mulder's) possession.]

"Lowder made Orme's forceps 1 in. longer, but left it unaltered in other respects, save that he dispensed with the leather cover, of which Orme approved. Orme's intent in altering the (Smellie's) forceps was to ensure uniform pressure on the fœtal head, an aim which, as I know from experience of this instrument, he has not attained. The shortness of Orme's forceps—the shortest of all such instruments—must surprise everybody, but we need no more wonder when we bear in mind that Orme never applied the forceps until the vertex had come down to the coccyx and perineum. Lowder's alteration served to protect the soft parts of the mother, which are liable to be caught and bruised in the lock of the shorter forceps."

Mulder gives references to his own plates of Lowder's forceps which, as in the case of Orme's, he had drawn from instruments in his own possession. Further on, Mulder, writing on the fenestræ of different forceps, expresses his preference for the broad fenestra and the widening of the blade at the base—the main features of the Orme-Lowder type—to the broad extremity and narrower fenestra of the blade in older instruments, as Orme's forceps allows of better adaptation to the protuberance of the parietal bones. We shall see that Blundell dwelt, in later years, on this point.

Neither Mulder's original "Historia," published in 1794, nor J. W. Schlegel's German translation, published in 1798, make any mention of Haighton, although Schlegel notices some forceps invented since the issue of the original work. Yet this broad short type of forceps is often associated with his name.

After learning this valuable evidence of a pupil of Orme and Lowder, the instrument here exhibited (fig. 7) becomes of greater interest.[1] It seems to be a compromise, being longer than Orme's, yet the handles are covered with leather. "Involucrum coriaceum, quo gaudebat *Ormiana* rejecerit," says Mulder, of Lowder. Perhaps the leather was only rejected for the blades; I will return to this side of the question in considering Kilian's drawings. Mulder figures both forceps (Orme's, pl. v, figs. 1 and 2, Lowder's, *ibid.*, figs. 3 and 4). In this College specimen the shanks diverge above the lock even more widely than in Orme's forceps in Mulder's plate; whilst in his drawing of Lowder's forceps he makes the shanks less divergent than in Orme's.

---

[1] The wide fenestræ and the broad blades perfectly level on their inner surface are characteristic of this type of forceps.

In Kilian's "Armamentarium Lucinæ Novum," 1856—his second and corrected atlas — Orme and Lowder's forceps are figured on pl. xviii. The Orme's instrument is very like the College specimen, though the divergence of the shanks is not so marked. He represents the leather covering of the handles continued up the shanks, only ending at the base of the blades. Possibly this was the case in the College specimen (fig. 7), as the upper part of the leather on both blades is ragged, as though it once went higher, but has broken off in course of time.

Before turning to later writers I must dwell a little on Kühn's statement as to the connexion of Orme and Lowder with Guy's Hospital and Mulder's association with those teachers. Then it will be necessary to speak of another obstetrician, Haighton.

I have endeavoured to trace Mulder's connexion with Guy's Hospital. On the title-page of his "Historia Forcipum et Vectium," he adds after his degree, "Societ. Med. Lond. in Nosocomio Guysiano Soc. honur." The Library at Guy's Hospital[1] possesses the first and third volumes of the Minutes of the Physical Society of Guy's Hospital. The first volume bears the date 1775 to 1783. Haighton joined the Society in 1778, being proposed for election by Cline. In the course of the same year Lowder was thanked for the use of his theatre, and in 1782 was President. There is no mention either of Orme or of Mulder. In 1783 Lowder seems to have been very active at the meetings, and it was in that year that Kühn's thesis was written, wherein Orme and Lowder are described as members of the staff of Guy's Hospital. The third volume of the minutes is dated 1794-98, but unfortunately the second volume is lost. It would include the meetings from 1784 to 1793—just about the time when Mulder was studying in London under Orme and Lowder. The third volume begins with the Minutes of 1794, the year in which Mulder's "Historia" was published. The loss of the intervening volume is most unfortunate. Haighton, who "improved" the Orme-Lowder forceps, read a paper on "Observations on Aneurysms" one month after his election in 1778.

I have consulted Dr. H. C. Cameron, Dean of the Medical School at

[1] I must here express my gratitude to the Librarian, Mr. Wale, for the pains he has taken in searching for these old archives.

Guy's Hospital, and he informs me that Drs. Orme and Lowder were never on the staff of Guy's Hospital, but were lecturers in the combined schools of St. Thomas's and Guy's. Mr. Henry Williams, Clerk to the Governors, kindly showed me the list of physicians and surgeons to Guy's in the eighteenth century, and the names of Orme and Lowder are, I find, conspicuous by their absence. I have further consulted Dr. Walter Tate, Dr. E. Stainer, Mr. Ballance, and Mr. G. Q. Roberts, Secretary to the Medical School, St. Thomas's Hospital. They find that there is no recorded evidence that either Orme or Lowder were ever on the staff of that institution.

The Museum of Guy's Hospital possesses a forceps marked "Lowder," very like a Lowder's forceps in its proportions, but the blades as well as the handles are entirely covered with leather. The handles and blades are wrought in one piece, but wood is let into the metal along the handles. The blades are 2½ in. (6·35 cm.) apart when the handles are closed. Close by it is another forceps of the Orme-Lowder type with shanks running upwards almost parallel to each other for over an inch, then they diverge at an angle of 70° to join the blade. The blade is not much broader at the base than at the free end, which lies 1½ in. from its fellow when the handles are closed. The fenestræ are much narrower than in Mulder's type. Perhaps this is the instrument of which Blundell complains on that account. It looks more like a primitive instrument than the well-known later modifications. There remains a third forceps in this series, the most remarkable of the three. It is marked "18th Century," but bears the name "Ferguson, Giltspur Street," a maker associated with St. Bartholomew's Hospital rather than with Guy's. Possibly it is simply a recent model, made for a class. It resembles in its general characters an Orme-Lowder forceps, but bears a Brunninghausen or German lock—a pivot with a broad, flat head, ⅞ in. (2·2 cm.) in long diameter, fitting into a notch in the opposite limb, and it is not lined with leather, but enamelled. The shanks, 1½ in. long (3·8 cm.), are considerably divergent, and the fenestræ very broad. Mr. Barry Hopkins informs me that a forceps of this type was once well known in the trade, and ascribed to Brunninghausen himself. The blades are similar to those of Haighton's forceps, but longer and not so square. Haighton's name has been closely associated with this type of forceps; indeed, many dealers and practitioners took it for the generic denomination of the type, ignoring Orme and Lowder. It is, however, as may be seen at a glance (fig. 8) clearly a development of its prototype—Orme's instrument.

Although its deviser, Haighton, was a co-lecturer with Lowder, Mulder's teacher, it is not figured in the "Historia," and, strange to say, Kilian does not represent it in his "Armamentarium" (1856). Yet it was once well known in England, and in 1825 David Davis wrote of it as the widest-bladed forceps ever invented before his own.[1]

John Haighton,[2] born in 1755, lectured in conjunction with Lowder on midwifery at the united schools of St. Thomas's and Guy's Hospitals, but was never appointed physician to either. His nephew, Blundell, assisted him in his lectures in 1814, and took the whole course four years later. Haighton died in 1823. He was a distinguished physiologist and an excellent obstetric operator. Among his writings we find "An Experimental Inquiry (*sic*) concerning Animal Impregnation,"[3] and "An Enquiry (*sic*) concerning the True and Spurious Cæsarean Operation."

Dr. Fawcett and Dr. Cock, who directed my attention to the eighteenth century forceps in the Museum of Guy's Hospital, to which I have already alluded, pointed out a "Haighton's forceps" in that collection (fig. 8). Probably invented about 1790, but possibly a few years later, it is an Orme's forceps with exaggerated breadth of the blades, which are broadest at the base, but narrowing to but a slight extent towards the tips, so as to look almost oblong. The fenestræ are 1⅝ in. (4·12 cm.) wide at the lowest and widest part, where the width across the blades is 3¼ in. (8·2 cm.). The shanks part widely as in the College forceps, but are thinner; the handles, on the other hand, are very similar, they are lined with leather reaching close up to the lock, and, as in this College specimen (fig. 7), it is not clear whether the leather lining ended below the lock or covered the shanks up to the base of the blades, as in the Orme's forceps figured in Kilian's "Armamentarium." The blades in the Guy's Museum forceps are ¾ in. longer than those of the College forceps and the fenestræ are broader, whilst the space between the tips of the closed blades is, on the other hand, ⅓ in. less.

Unfortunately, Haighton himself has left no published account of his forceps. "A Syllabus of the Lectures on Midwifery," delivered at Guy's Hospital by Dr. Haighton, is preserved,[4] with some MS. notes by Blundell. The date is 1811. At p. 50 the syllabus reads: "The *Forceps:* A variety of specimens are shown and their disadvantages considered." Had the variety been described in detail much of the lost history of the Orme-Lowder forceps would have been saved. A valuable copy of the Syllabus bearing the date 1803, once in the possession of Dr. Harry Blaker, of Brighton, and now in the Library at Guy's Hospital,[1] and a copy of Haighton's Lectures in manuscript, in the same Library, contain much of interest, but not a word about Orme, Lowder, or their forceps.

---

[1] "Elements of Operative Midwifery," p. 38.

[2] Article "Haighton, John," Sir S. Lee's "Dictionary of National Biography," and Wilks and Bettany's "Biographical History of Guy's Hospital," p. 363.

[3] *Philosoph. Trans.*, 1797, lxxxvii, p. 159.

[4] In the Library of the Royal Society of Medicine.

Dr. James Blundell, born in London in 1790, studied at the United Borough Hospitals under Haighton, his uncle. He was for many years connected with Guy's Hospital as Obstetric Physician and Lecturer on Midwifery. He died in 1877, leaving a fortune of £350,000. We find in his "Principles and Practice of Obstetricy" (*sic*), 1834, p. 520, an important statement. Orme and Haighton are mentioned, but Lowder is ignored.

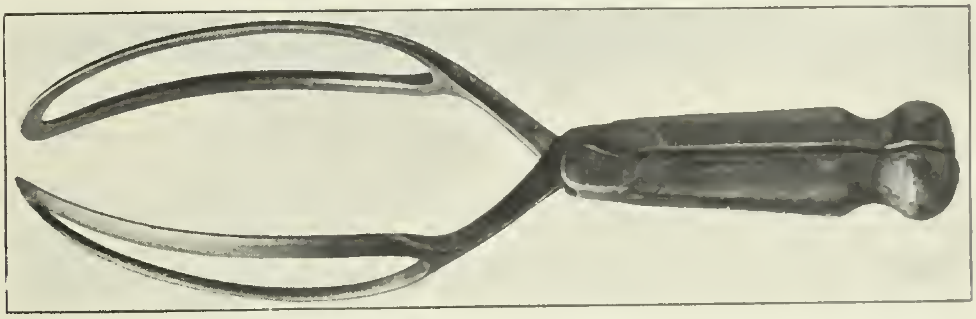


FIG. 8.

Haighton's forceps. Museum of Guy's Hospital.

"Now, of the straight forceps there are two forms which, I think, deserve your approbation, though much nicety in the shape of the instruments is really not of much importance. The two forms of forceps are those of Dr. Orme and those of my predecessor, Dr. Haighton, a man to whom I owe everything that is good both in precept and example. Dr. Orme's forceps are to be commended for their exact adaptation to the sides of the head, and are formed with the blade of (*sic*, corrected in the second edition into 'and') the fenestra so narrow that the opening will scarcely admit the forefinger. The main defect chargeable upon this instrument is, that when laid over the side of the head in the usual manner the limbus (the bar of iron forming the blade and containing the fenestra) enlarges the cranium, where if instruments really be required, it is generally already too large; I mean over the protuberances of the parietal bones. Now Dr. Haighton's instrument has the advantage of a large fenestra, the limbus being made a little thinner; so that the protuberance of the parietal bones lying in the fenestra on a level with the blade, or even projecting a little beyond, there is no addition of bulk over the protuberances. If there be any defect in Haighton's forceps it consists in the breadth of the blades, which is so great that they are not very easily passed up through the genital fissure."[1]

---

[1] Presented by Dr. Galabin.

There remains some uncertainty about Haighton's forceps. It would seem, according to the evidence of his nephew and pupil, that the essential feature of his forceps was its wide fenestræ, yet Kühn made out that Orme's had wide fenestræ as an essential feature. A later writer, Radford, figures what he specifically distinguishes as Haighton's forceps in his "Essays on Various Subjects connected with Midwifery" (1839), in a plate, "Division No. 2 A, 1 and 2." The forceps is represented as quite different from the instrument which I exhibit and from Orme and Mulder's forceps. There is no wide divergence of the shanks, and the handle is much more slender. Possibly it is a late modification that Radford represents in his "Essays."

In the curve of the shanks of the forceps which I bring before you, it resembles Conquest's short forceps as figured in Kilian's "Armamentarium" (pl. xxvii, fig. 1). I have, however, read through an article written by Conquest himself, "Practical Remarks on Obstetric Instruments," in the *London Medical Repository*, March 1, 1820, where the author's short forceps is figured. The blades are much thinner than those of the College instrument and do not widen out at their junction with the shanks. Besides, the essential feature in Conquest's forceps (absent in the Orme-Lowder type) was a screw arrangment by which the upper blade could be detached from its handle so that there should be "no difficulty in introducing the upper blade of the short forceps directly over the vertex, without changing the position of the patient. After the blade is fixed the handle is to be screwed on, and the instrument used as any other" (loc. cit., p. 188). Reflecting or movable handles were in vogue when Conquest wrote this description of his forceps.[1]

---

[1] In an American edition of Denman's "Introduction to the Practice of Midwifery" (New York, 1821), the editor, Dr. John W. Francis, observes in a footnote (p. 370) that Haighton's forceps was, at the time he wrote the note, the popular form of that obstetrical instrument in use in the United States. As said above, Haighton's name usurped that of Orme and Lowder, and hence possibly the earlier type was often misnamed in America as in England.

There is no arrangement for detaching the blade in the College forceps which, according to its donor, was in use before 1815. Conquest was born in 1789, and did not take his Doctor's Degree at Edinburgh until 1813. He did not practise midwifery until a few years later. It is clear that his forceps was of an early nineteenth century type based on Orme's instrument and its modifications, though the screw arrangement represented a complete departure from the original forceps.[2]

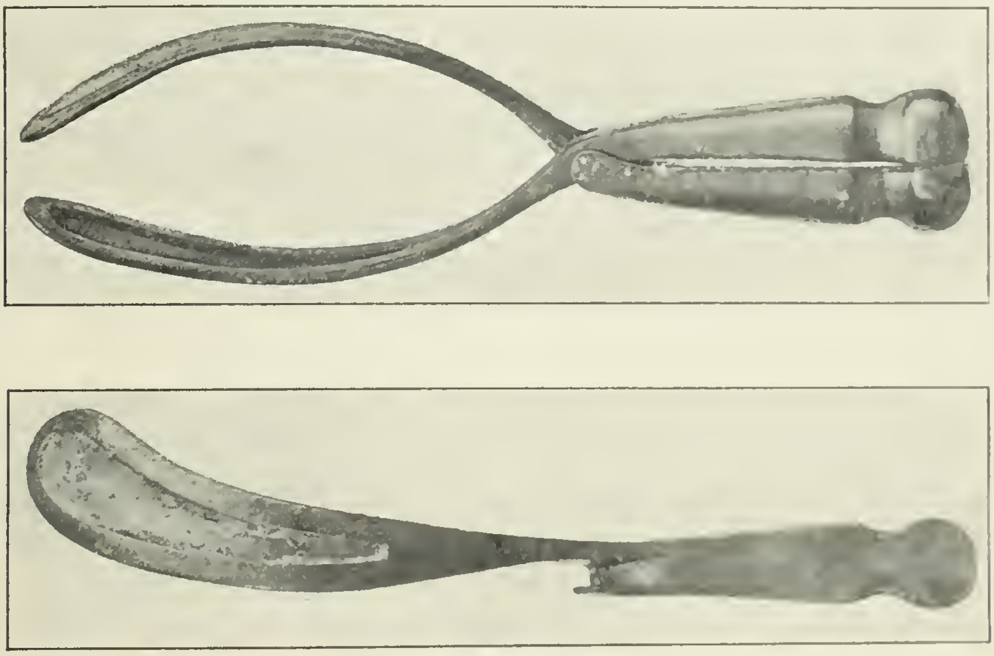


Fig. 9.

Osborn's forceps. Surgical Instrument Collection, Museum of the Royal College of Surgeons.

Osborn's Forceps.

The last instrument which I show to-day was presented to the Museum of the Royal College of Surgeons by Dr. Clement Dukes, who had received it from an old practitioner. As the great Denman testified in 1783, it is a miniature Levret, intended to combine the qualities of the long and the short forceps. Osborn's forceps (fig. 9) is completely enveloped in leather, fenestræ included. It is a strange thing to contemplate in these days of asepsis; yet many authorities and hundreds of practitioners used instruments of this and other types similarly covered with leather well into the middle of the nineteenth century. One of David Davis's forceps, in use in 1825, had its blades coated with two layers of leather and a third of flannel between them, and the blade bore a complicated hinge-joint near its extremity! McClintock, in the notes to his well-known edition of Smellie's "Treatise on the Theory and Practice of Midwifery," declares that in 1861, when the edition was published, the leather lining to the blades had been abandoned by all obstetricians, except Roberton, of Manchester. This forceps precisely corresponds to a full-sized drawing in Osborn's "Essays on the Practice of Midwifery" (1792) opposite p. 50, where he describes it[1] as "the instrument which I should recommend in preference to all others." He says no more about it, nor does he explain how it differs from Smellie's short forceps, an important matter, as the blades of Smellie's short forceps had no pelvic curve. In the introduction to his chapter on forceps he speaks in general terms of that instrument, how it should be adapted to the maternal pelvis, and so on. *The measurements given under Osborn's engraving correspond precisely to those of this forceps in the College Museum:* "Whole length, 11¼ in. [28·125 cm.]: from the angle of the joint, 6¼ in. [15·8 cm.]: handles to the angle of the joint, 5 in. [12·7 cm.]; breadth between the blades at the widest part of the curve, 2¾ in. [7 cm.]; breadth of blade near point, 1½ in.[2] [3·8 cm.]; breadth of blade at centre, 1¼ in." [3·17 cm.]. Osborn gives no other measurements. The distance between the extremities of the closed blades is ¾ in. (1·95 cm.), and the leather-covered fenestræ are 1⅞ in. (4·75 cm.) wide at their widest point. It weighs 11 oz. (312 grm.), precisely the same weight as the Orme-Lowder forceps here exhibited. Like most British forceps of its day, the handles have the usual palm-rest, and taper to the lock without any flange or finger-rest. The lock is of the English type. There is no distinction between shank and blade, and the blades, moderately broad, bear a pelvic curve, and are broadest at the end and not very far apart there when the handles are closed. It thus differs conspicuously from the Orme-Lowder and Haighton type. Osborn, like the better-known Denman, and a teacher called Thynne, preferred his forceps broadest at the extremity.

---

[1] *See* David Davis's "Elements of Operative Midwifery," 1825, pl. i to v.

[2] A drawing of Conquest's forceps is also to be found in his "Outlines of Midwifery," 1854, p. 134, but it is not so good as the drawing in his "Practical Remarks."

---

[1] The quotation is from a copy of the Essays in the Library of the Royal Society of Medicine.

[2] In the College specimen it is as broad as 1[illegible] in. [1·12 cm.] just 1 in. from the tip.

Osborn, we can see, did not give a full account of his forceps. The indefatigable Mulder, on the other hand, not only quotes Osborn in his "Historia," but gives a drawing of the whole forceps and of one blade placed sideways after the inventor's sketch. He quotes the "Essays" as "a very useful book," and adds, "see Osborn's drawing which represents only one arm, but when I was in London I sketched the instrument itself, as well as those of Denman and Thynne." Orme's and Lowder's instruments, we explained, were also drawn by Mulder himself. We can place much confidence in so careful an author, hence his account deserves to be quoted in full: "William Osborn, a teacher of obstetrics in London, has made use of a special forceps for several years, but only described it at the end of the year 1792 and published a drawing." Mulder's "Historia" appeared in 1794. He adds in a footnote the passage above quoted relating to the sketching of several English forceps by himself. "Osborn's forceps consists of two arms, the blades are fenestrated and have the *curvatura nova* (pelvic curve) much as in Saxtorph's.[1] The arms are united by a joint (English), and the handles are of wood. Save in some of its measurements, this instrument differs little from Smellie's curved forceps, as will be seen in my table of measurements under the names of Smellie and Osborn." Mulder then states that, like several other English authorities, Osborn never applied the forceps as long as the head was above the brim and that he applied the first blade over the fœtal ear.

Mulder's measurements are reproduced at the end of these notes. We saw that he likened Osborn's forceps to Smellie's *curved* instrument, but it will be seen that the latter, "Smellie II," measured 12½ in. The measurements of "Smellie I," the short straight forceps, correspond much more closely to his (Mulder's) measurements of the Osborn's forceps in his possession. "Forceps *Osbornii* constat ex duobus Brachiis quorum Cochlearia fenestrata curvatura habent *novam*," writes Mulder, and

---

[1] Mulder gives the date of the publication of Saxtorph's forceps as 1791, Osborn's appearing in 1792. Saxtorph's was, like Osborn's, a miniature Levret, a short, curved forceps in fact (Levret I, 18 in. long; Levret II, 16¼ in.; Saxtorph, 12 in.; Osborn, 11¼ in.). Its handles were jointed so that it might be folded up and carried in the obstetrician's pocket (*see* Mulder, loc. cit., pl. vi, figs. 3 and 4). In 1866, Nyrop, of Copenhagen, exhibited a Saxtorph's forceps at a conversazione held by the Obstetrical Society of London. It is figured in the catalogue published that year. Nyrop particularly drew attention to the small pelvic curve, and declared that most old practitioners in Denmark still used it (i.e., in 1866).

"novam" is in italics in the original text. In short, according to the testimony of Mulder, Osborn's forceps with the pelvic curve was of the dimensions of Smellie's short straight forceps. This, it will be seen, corresponds with Denman's remarks on Osborn's instrument. Osborn's own measurements correspond more closely than Mulder's with those of the instrument I exhibit, as will be seen from the appended tables.

The very similar forceps of Denman and Thynne were drawn *ad ipsa instrumenta* by Mulder, whilst Kilian, in his "Armamentarium," gives drawings of both and represents both (pl. xx, figs. 1 and 2) with a piece of metal in the lower part of the blade[1] cut out to lodge the leather which invested it, as it is invested in his drawing of Orme's forceps, though in that instrument there was no notch. Mulder ("Historia," pl. vi, "Denman," figs. 7 and 8, "Thynne," figs. 9 and 10) does not represent any notch. Neither Osborn himself, Mulder, nor Kilian, show a notch in Osborn's forceps, nor is it represented in the College specimen. We may conclude, therefore, that the forceps was sometimes modified by the inventor himself, or altered after his death.

A few words must be said about the two other forceps just mentioned. The measurements of all are given in Mulder's "Historia," and reproduced at the end of this communication.

We must now consider Denman himself. We shall find that he recognized Osborn, described the precise characters of that obstetrician's forceps, and devised a forceps of his own, but we know that though short, light, and with slender blades, broadest near the free ends, like Osborn's and Thynne's, the blades were straight, and there is no evidence that Denman ever contrived a modification of his own forceps with curved blades.

Thomas Denman (1733-1815), the son of a country doctor in Derbyshire, began life as a Navy surgeon and afterwards became one of Smellie's numerous pupils. He lectured on midwifery, and in 1769 was elected Obstetric Physician to the Middlesex Hospital, holding that appointment for nearly twenty-five years. He distinguished himself in his advocacy of the induction of premature labour. His son became the eminent Lord Chief Justice, Lord Denman, and one of his twin daughters married Matthew Baillie, the other becoming the bride of the ill-fated Sir Richard Croft, who attended the Princess Charlotte and committed suicide. Had he made use of his father-in-law's forceps how English history would have been altered! That Denman was an eminent man there can be no doubt. He was apparently the first to interpret the true nature of the "snuffles" in syphilitic infants. He was far better known and has been much longer remembered than the two other obstetricians who contrived short light forceps. He testifies to Osborn's priority as early as in 1783.[1] "The curve of the Levrett's (*sic*) forceps seems the most convenient and Mr. (*sic*) Osborn has contrived a very elegant pair, by diminishing the size of Levrett's and very little alteration besides." Thus he advocated a short forceps *with* the pelvic curve. Denman's own views of the use of the forceps are well known. They are most conveniently arranged in detail in the second edition of his "Introduction to the Practice of Midwifery" (1801). He commends Smellie as the inventor of a "kind of forceps more convenient than any before contrived" (loc. cit., p. 98), and does not speak of his own modification. In looking over the fifth, or 1805, edition, I find on p. 357, in his chapter "On the Forceps," the following important statement: "The *common curvature* was varied according to the opinion entertained of the form and dimensions of the head of a child at the time of birth; but the *lateral curvature* was given for the accommodation of the instrument to the form of the pelvis, or for lessening the pressure, and of course the danger, of lacerating the external parts whilst the child was extracting." Then Denman proceeds to commend Smellie's instruments as "being simple in their (*sic*) construction, applicable without difficulty, and equal to the management of *every case in which the forceps ought to be used*." Lastly, Denman states that "I have, with *very little alteration*, adapted the following *rules* to them."

---

[1] In Osborn's, Thynne's and Denman's forceps there is no conspicuous distinction between shank and blade, so prominent in Orme's instrument.

In the above quotations the italics are my own. Denman, as we learn from the last sentence, did not even allude to his modification of Smellie's forceps, for his "very little alteration" referred to the "rules" for application of that instrument of Smellie's. But, writing earlier in 1783, Denman advocated Osborn's forceps, which he rightly described as a miniature "Levret," which had the pelvic curve. In the 1805 edition of his Introduction he speaks of the "lateral curvature," apparently with approval, and forthwith teaches that Smellie's forceps was fit for "every case in which the forceps ought to be used." There is some obscurity here, but most reasonably we may assume that Denman was referring to Smellie's *curved* forceps.

---

[1] This quotation is taken from "A Vindication of the Forceps described and recommended by Dr. Leake: by a late Pupil of Dr. Leake's," 1783, p. 19. Leake devised a three-bladed forceps.

Yet by "Denman's forceps" we generally understand a short instrument with blades rather slender and broadest at the free ends, as in Smellie's, and unlike Orme's, and with a space between the free ends when the handles are closed as in Orme's but not in Smellie's. The blades, however, are straight, that is, there is no pelvic curve. *On donne toujours aux riches.* There seems to be an idea that Denman devised another short forceps *with* the pelvic curve. I suspect Osborn's has been ascribed more than once to Denman. Osborn preceded him; he was born in 1732 and was a pupil of Levret's and also of William Hunter's. Now we can see that Denman's observations above quoted implied that Osborn's forceps was constructed before his own, just as Lowder admitted in his lectures that Orme was his predecessor. Denman, born in 1733, was only one year younger than Osborn and studied under Smellie, but he became a Navy surgeon and took to the practice of obstetrics later than the less remembered obstetrician.

Mulder's description of Denman's forceps, as he carefully compared the three instruments, deserves to be reproduced: "Although Thomas Denman, teacher of obstetrics in London, contended that the vectis was safer and more handy and, indeed, preferable in certain cases, nevertheless, a forceps bearing his name is known in London and he is accustomed to use it. This instrument has two arms with straight, fenestrated blades. They are joined by an English lock and the handles are wooden. They differ from Smellie's forceps mainly in the relation of the handles to the blades, in the distance of the blades from each other and in their breadth, all made clear in the tables of measurements." Mulder says nothing about a pelvic curve, and represents Denman's forceps as straight. As Dr. F. W. Cock informs me, there is a genuine Denman's forceps, still partly covered with leather, in the Museum of Guy's Hospital, the property of the late Dr. Tait, about 1837.

Thynne has sunk into oblivion even deeper than Osborn. The Library of the Royal College of Surgeons possesses a quarto note-book. On one back is written, "Lectures on the Theory and Practice of Midwifery and the Diseases of Women and Children, by Drs. Osborn and Clarke, 1790-1791, in two Books—Book 2nd." On the opposite back is written, "Abstract of Dr. Thynn's Lectures, 1805." In neither manuscript abstracts is there any allusion to the place where the lectures were delivered, and as for orthography, it is not clear whether that of the writer or that adopted by Mulder is correct. The Thynn end, as we may rightly call it, of the note-book concerns us at present. There is no mention of forceps except at p. 36. "The forceps he described as a very useful and safe instrument, the *(sic)* were invented by Chamberlen and much improved by Smellie." There is no allusion to Thynne's own or any other special kind of forceps. On the Osborn-Clarke side of the note-book there is nothing about any forceps. Osborn, the annotator records, taught his pupils that the habit of drinking "is certainly the worst thing that a medical man can be guilty of, *as it always must cut up his practice.*" Then he mentions the name, we regret to say, of a misguided obstetrician who attempted version when under the influence of alcohol and ruptured the uterus.

TABLE OF MEASUREMENTS OF FORCEPS.

	Length of forceps	Length of blade	Length of handle	Greatest breadth of blades	Distance of broadest part from tip	Greatest space between blades	Distance between tips when closed	Length of fenestra	Greatest breadth of fenestra
	in.	in.	in.	in.	in.	in.	in.	in.	in.
Grégoire, Mulder ...	15	$8\frac{1}{3}$	$6\frac{2}{3}$	$1\frac{2}{3}$	1	$2\frac{1}{6}$	$1\frac{1}{4}$	$5\frac{5}{6}$	$\frac{5}{6}$
Grégoire, Museum of the Royal College of Surgeons	17	$8\frac{1}{2}$	$8\frac{1}{2}$	$1\frac{3}{4}$	2	$2\frac{3}{8}$	None	$7\frac{1}{2}$	$\frac{7}{8}$
Smellie I (straight), Mulder	11	$6\frac{1}{2}$	$4\frac{1}{2}$	$1\frac{1}{6}$	$1\frac{1}{4}$	$3\frac{2}{3}$	None	4	$\frac{1}{4}$
Smellie II (with pelvic curve), Mulder	$12\frac{1}{2}$	$7\frac{3}{4}$	$4\frac{3}{4}$	$1\frac{1}{3}$	$1\frac{3}{4}$	$3\frac{1}{4}$	None	5	$\frac{3}{4}$
Orme, Mulder	$10\frac{1}{3}$	$5\frac{5}{6}$	$4\frac{1}{2}$	$1\frac{1}{2}$	$3\frac{1}{4}$	$2\frac{3}{4}$	1	$3\frac{1}{2}$	$\frac{5}{6}$
Lowder, Mulder	$11\frac{1}{3}$	$6\frac{1}{2}$	$4\frac{5}{6}$	$1\frac{1}{2}$	4	$3\frac{5}{12}$	$\frac{2}{3}$	$4\frac{1}{2}$	$1\frac{11}{12}$
Orme-Lowder, Museum of the Royal College of Surgeons	11	$5\frac{1}{2}$	$5\frac{1}{2}$	$1\frac{3}{4}$	4	$3\frac{1}{4}$	$1\frac{3}{8}$	$4\frac{1}{4}$	$1\frac{1}{5}$
Haighton, Guy's Hospital	11	$6\frac{1}{4}$	$4\frac{3}{4}$	$1\frac{7}{8}$*	4	$3\frac{1}{4}$	$1\frac{3}{8}$	$4\frac{1}{2}$	$1\frac{3}{8}$
Osborn, Mulder	$11\frac{1}{4}$	$6\frac{3}{4}$	$4\frac{1}{2}$	$1\frac{1}{3}$	$1\frac{1}{6}$	$3\frac{1}{4}$	$\frac{1}{12}$	$4\frac{1}{6}$	$\frac{11}{12}$
Osborn, Museum of the Royal College of Surgeons	$11\frac{1}{4}$	$6\frac{1}{4}$	5	$1\frac{3}{8}$	1	$2\frac{3}{4}$†	$\frac{3}{4}$	$4\frac{1}{4}$	1
Denman, Mulder ...	$10\frac{3}{4}$	$6\frac{7}{12}$	$4\frac{1}{6}$	$1\frac{5}{12}$	$1\frac{1}{6}$	$3\frac{5}{12}$	$\frac{1}{6}$	$4\frac{1}{2}$	$\frac{11}{12}$
Thynne, Mulder ‡ ...	11	7	4	$1\frac{1}{3}$	$1\frac{1}{6}$	$3\frac{1}{4}$	$\frac{7}{12}$	$4\frac{1}{12}$	$\frac{11}{12}$

* In the original "Haighton" the blades, very broad, diminished but little towards the tip.

† Same as in Osborn's "Essays." Mulder makes this measurement half an inch more.

‡ Mulder's "pol." is rendered as "in." (inch) throughout. The actual length of a Dutch inch being uncertain and the majority of these measurements being taken from the "Historia Forcipum," "pol." has not been reduced to centimetres.

Mulder, it will be seen, teaches us more about Thynne's instrument than can be learnt from the scanty records left by that obstetrician himself. "Thynne, a teacher of obstetrics in London, makes use of a forceps which closely resembles Osborn's. The blades are, as in the latter, fenestrated, and are also curved. The lock is likewise a hinge (Mulder means an English lock without a pivot, such, as he shows, was adopted by Chapman and then by Smellie), and the handles are also wooden. The main difference is that in Thynne's forceps the proportion of the blades to the handles is greater,[1] and the distance between the blades at the tips is wider, whilst, on the other hand, the angle at which the blades diverge is less.

Medical Allusions in the Writings of Francis Bacon.

By G. W. Steeves, M.D.

The subject which I have chosen is a very wide and comprehensive one, and even for our present purpose a survey of those works which may be considered the "true and authentic" writings of Francis Bacon will perhaps more than tax our powers of inquiry and patience; therefore, I may at once dispel all fear by stating that it is not my intention to include any references, however interesting, from the pages of such authors as Shakespeare, Spencer, or even Robert Burton. These must be left to those enthusiastic controversialists who place the great philosopher on an even higher pedestal than I do.

We need not wonder that a man with such philosophic attainments, such powers of observation and love of experimental science, has left in various portions of his voluminous writings evidences that the science of medicine has not escaped his notice. Indeed, there is scarcely any Baconian work of importance where some interesting reference to medical science may not be found. In a general way Bacon seems to have been well versed in the writings of Hippocrates, Celsus, Galen, and others who followed them, and those of his own day had evidently been duly and critically investigated by him: so that in many places we find him speaking as if he were an astute physician rather than the leading philosophic light and legal exponent of the period.

---

[1] *See* "Tables of Measurements" (p. 75). Though Thynne's forceps was only 11 in. long the blades took up 7 in. In Saxtorph's, the first miniature Levret (*vide supra*), the instrument was 12 in. long, yet only 6½ in. were taken up by the blades. Osborn's had blades 6¾ in. in length, whilst its entire length was 11¼ in. Thus his blades were proportionately longer than Saxtorph's, and Thynne's were proportionately and absolutely longer than Osborn's or Saxtorph's. It is unfortunate that no record of an unprejudiced and experienced critic as to the relative merits of these three miniature Levret's forceps has been preserved.

For convenience it will be well to consider our subject under the following heads:—

(1) Bacon's mental attitude towards the profession, and the duties pertaining to it.

(2) His views on public and domestic hygiene.

(3) Remarks on disease in general, and special diseases.

(4) Medicines and special medical applications.

(5) The special senses.

(6) Generation, decay and death.

Let me at once quote a few noble lines from the preface of his ‘Maxims" which every medical man might well take to heart as he enters upon his life's work. Bacon speaks as follows: "I hold every man a debtor to his profession, from the which as men of course do seek to receive countenance and profit, so ought they of duty to endeavour themselves, by way of amends, to be a help and ornament thereunto. This is performed in some degree by the honest and liberal practice of a profession, when men shall carry a respect not to descend into any course that is corrupt and unworthy thereof, and preserve themselves free from the abuses wherewith the same profession is noted to be infected; but much more is this performed if a man be able to visit and strengthen the roots and foundation of the science itself; thereby not only gracing it in reputation and dignity, but also amplifying it in perfection and substance."

Bacon never ceased in his efforts to advance the cause of science, and those departments which fostered and in any way pertained to medicine received special recognition from him. In the "Novum Organum" he refers to natural philosophy—"the great mother of the Sciences," as he terms it—being made "to wait upon Medicine." And again speaking of the advancement of Science, he says: "Let no one expect any great progress in the Sciences (especially their operative part) unless natural philosophy be applied to particular sciences, and particular sciences again referred back to natural philosophy. For want of this, astronomy, optics, music, medicine itself have no depth, but only glide over the surface and variety of things. . . . We can little wonder that the Sciences grow not when separated from their roots." Then later, applying his induction, he adds: "For the discovery and demonstration of the arts and sciences should separate Nature by proper rejections and exclusions, and then conclude for the affirmative after collecting a sufficient number of negatives." After such a passage as this it is impossible to over-estimate the value of Bacon's method of reasoning in our own special department of medicine. He, indeed, emphasizes what he admits Plato may have attempted.

Locke said: "Were it my business to understand physic, would not the safer way be to consult Nature herself in the history of diseases and their cures?" So in his "Advancement of Learning" we find Bacon going to the root of the matter, as he usually did. Let me quote passage: "Physique, taking it according to the derivation and n according to our idiom for medicine, is situate in a middle term distance between Natural History and Metaphysique. For Natu History describeth the variety of things; Physique, the causes, b variable or respective causes; and Metaphysique the fixed and consta causes." In a letter to Father Baranzano in the year 1622, referring Physics in the wider scientific sense, he says: "When true Physics ha been discovered there will be no Metaphysics. Beyond the true Physic is Divinity only." In portions of Bacon's works we have ample evidence of the fact that although his ideals were of the highest order, he recognized that the doctors of his day were not without their frailties and shortcomings. While in the "Advancement of Learning" he says: "This subject of man's body is of all other things in nature the most susceptible of error. For the same subtilty of the subject doth cause large possibility and easy failing; and therefore the inquiry ought to be the more exact," we read in his "Filum Labyrinthi": "The physician pronounceth many diseases incurable, and faileth oft in the rest." And again, in the same treatise, he adds: "Men strive against themselves to save the credit of ignorance, and to satisfy themselves in this poverty. For the physician, besides the cautels of practice, hath this general cautel of art, that he dischargeth the weakness of his art upon supposed impossibilities: neither can his art be condemned when itself judgeth. The old English word "cautel" which Bacon uses twice in this passage, we also find in Shakespeare, conveying the same meaning. For instance in the passage:—

> "No soil nor cautel doth besmirch
> The virtue of his will."

Let me add one of his metaphors; it is taken from the "Wisdom of the Ancients": "In every knowledge and science, and in the rules and axioms appertaining to them, a mean must be kept between too many distinctions and too much generality, between the rocks of the one and the whirlpools of the other. For these two are notorious for the shipwreck of the wits and arts."

Bacon was quite alive to the difficulties that medical men of his day had to contend against, and the imposture that constantly arose to defeat their art. Allow me to quote a passage or two from the "Advancement of Learning" apropos of this: "The Poets did well to conjoin Music and Medicine in Apollo: because the office of medicine is but to tune this curious harp of man's body and to reduce it to harmony. So that the subject being so variable, hath made the Art by consequence more conjectural; and the Art being conjectural hath made so much the more place to be left for imposture. For almost all of the Arts and Sciences are judged by acts, or masterpieces, and not by successes and events. . . . The physician is judged most by the event, which is ever but as it is taken: for who can tell if a patient die or recover. . . . And, therefore, many times the impostor is prized and the man of virtue taxed. Nay we see the weakness and credulity of men is such, as they will often prefer a mountebank before a learned physician. . . . For in all times, in the opinion of the multitude, witches and old women and impostors have had a competition with physicians."

For other matters of interest in connexion with this portion of our subject I must refer you to Bacon's work itself. I need only add in passing that three hundred years have not deprived us of those witches, old women and impostors, and that the competition to which Bacon alludes more than survives at the present day.

Under the "Fable of Prometheus or the State of Man" Bacon concentrates a thought, embodied in a quaint humour, which will interest some sections of our fraternity even now. He says: "For my own part I certainly think that those two faculties—the Dogmatical and the Empirical—have not yet been well united and coupled; but that the bringing down of new gifts from the gods has ever been left either to abstract philosophers, as to a light bird, or to sluggish or tardy experience, as to an ass. And it must be said in behalf of the ass, that he might perhaps do well enough but for that accident of thirst by the way. For if a man would put himself fairly under the command of experience, and proceed steadily onward by a certain law and method, and not let any thirst for experiments either of profit or ostentation seize him by the way and make him lie down and unsettle his burden in order that he may taste them, such a man I do think would prove a carrier to whom new and augmented measures of Divine bounty might be well enough entrusted."

In the same discourse we shall find a most interesting allusion to the physical state of man and his mental possibilities—as follows: "Nor is it without meaning that in the mass and composition of which man was made, particles taken from the different animals were infused and mixed up with the clay: for it is most true that of all things in the Universe man is the most composite, so that he was not without reason called by the Ancients the little world. For, although the Alchemists, when they maintain that there is to be found in man every mineral, every vegetable, &c., or something corresponding to them, take the word microcosm in a sense too gross and literal, and have so spoiled the elegance and distorted the meaning of it; yet that the body of man is of all existing things both the most mixed and the most organic, remains not the less a sober and solid truth. And this is indeed the reason it is capable of such wonderful powers and faculties."

The chief object of Bacon's philosophy must be evident to all: that he has distinctly advanced the cause of scientific medicine by such methods as we find repeated through his voluminous treatises we must all agree. He took a strong stand against the old process of reasoning and the previous philosophical methods which proceeded from insufficient data or hypotheses without any foundation of fact. He attempted to make evident, and once for all banish, the pitfalls of syllogistic reasoning, the conclusions of which could only be founded on unreliable premises; alone being content to go back to "first principles," and then proceeding by a scientific and true method of deduction. This, indeed, was the true aim of his work. Thus would his observations and experiments provide a sure basis for reasoning, and surely we must acknowledge that he did much to establish this great lesson, without which no true advance in any science can be made. His object is well described in a few lines by Macaulay, when he says: "In Bacon's opinion philosophy was made for man; it was a means to an end, and that end was to increase the pleasures and mitigate the pains of millions, who are not and cannot be philosophers."

Before leaving this part of our subject I must refer to the opinion of Bacon as expressed in the "Advancement of Learning," with reference to the remuneration of professors, &c. It would seem, from his observation, that this class had as little consideration then as now. He says: "Because founders of colleges do plant, and founders of lectures do water, it followeth well in order to speak of the defect which is in public lectures; namely, in the smallness and meanness of the salary or reward which in most places is assigned unto them; whether they be lectures of arts or of the professions. This cannot be, except their condition and endowment be such as may content the ablest man to appropriate his whole labour." Later he adds; "So as, if you will have the sciences flourish, you must observe David's military law, which was—That those which stand with the carriage should have equal part with those which were in the action, else will the carriages be ill attended."

I should like to add Bacon's advice to the patient on his selection of a doctor. You will find it in the essay of "A Regimen of Health," where he says; "Physicians are some of them so pleasing and comfortable to the humour of the patient, as they press not the true cure of the disease; and some others are so regular in proceeding according to art for the disease, as they respect not sufficiently the condition of the patient. Take one of a middle temper; or if it may not be found in one man, combine two of either sort; and forget not to call as well the best acquainted with your body, as the best reputed of for his faculty."

Bacon seems to have very thoughtfully considered the patient's interest and point of view, and in several places he throws out suggestions as to how they ought to receive the directions of their medical men: for, again, in the "Advancement of Learning" we find this passage: "Although a man would think, by the daily visitations of the physicians, that there were a pursuance in the cure: yet let a man look into their prescripts and ministrations, and he shall find them but inconstancies and every day's devices, without any settled providence or project. Not that every scrupulous or superstitious prescript is effectual, no more than every straight way is the way to Heaven; but the truth of the direction must precede severity of observance."

This quotation fairly well sums up his own feelings, and on the whole cannot be considered too flattering towards the profession: at the same time it emphasizes the necessity of confidence on the part of the patient as the initial step toward the cure.

The second portion of my thesis refers to Bacon's allusions to *public and private hygiene.*

In the year 1623 he issued his "Historia Vitæ et Mortis." It was an effort to which he himself attached much importance, dealing as it did with "the prolongation and setting up of human life," and it was prepared with the greatest care. In it he describes how the processes of life influence longevity, and he attempts to establish a theory of the presence of a "Vital Spirit" permeating all animals and plants. He formulates certain "Articles of Inquiry" which he considers necessary in the consideration of the prolongation and restoration of life. Here are some passages from this remarkable work: "Inquire into the length and shortness of life with the proper circumstances which seem to contribute to them. Inquire into the length and shortness of men's lives according to the times, countries, climates and places in which they were born and lived, to their food, diet, manner of living, exercise. With regard to the air in which they live and dwell. Into their studies, kinds of life, affections of the mind and various accidents. Into the medicines which are supposed to prolong life. Into the signs and prognostics of a long and short life. Into those which appear and are observed even in health, whether taken from physiognomy or otherwise. Into the things which preserve and exempt the body of man from arefaction and consumption, or at least which check and retard the tendency thereto. Into the things which belong to the general process of alimentation, that it may be good and with as little loss as possible. Into the things which clear away the old matter and supply new, and every kind of death by privation and want." &c.

Then again he ventures on many points some of which may appear to us fantastic and unreasonable at the present day, but display great insight and observation. He states: "Early and late baldness is a thing immaterial, for many bald men have been long-lived. Nor are early grey hairs (though they appear to be the precursors of old age) any sure sign. Premature greyness without baldness is a sign of longevity. A moderate-sized neck, neither too long and slender, nor too thick and sunk into the shoulders, wide nostrils, a large mouth, ears gristly, not fleshly, teeth strong and close set, are signs of long life, and much more so if the new teeth come late in life. Also a broad chest, a flat stomach, a large hand. Thighs not very fleshy. A calf not drooping but firm. Senses not too acute. A pulse slow in youth, but quicker as age increases. A power of holding the breath easily and long. The bowels more costive in youth. A life spent in religious and holy offices seems to contribute to longevity. A country life in the open air, not indolent but active, living generally on fresh and home-made food, and free from care and envy. I am in some doubt whether frequent bleeding tends to longevity, but I am rather inclined to believe that it does, if it be turned into a habit, and other things are favourable thereto."

This learned discourse also emphasizes the importance of pure drinking-water, a hard couch, cold air, a spare diet, few sensual pleasures, avoiding too much exercise and all fatigue.

In his "Sylva Sylvarum," Bacon discusses his experiments on "Exercise of the Body," and on certain forms of food, such as bread, fats, sweets, &c., and also describes those conditions which induce and accelerate putrefaction in bodies, as well as those surroundings which prohibit and check it. In this work, in addition to many pertinent allusions, it is interesting to notice his remarks on the selection of water. He mentions spring-water, rain-water, snow-water, &c. With reference to the latter, he says that it is unwholesome; insomuch as the people that dwell at the foot of the snow mountains (especially women) by drinking of snow-water have great bags hanging under their throats." Later, he says: "Springs on the tops of high hills are the best—are more pure and unmingled. Waters in valleys join in effect underground with all waters of the same level. Judgment may be made of waters by the soil whereupon the water runneth, as pebble is the cleanest and best tested, and next to that clay water, and thirdly waters upon chalk, fourthly upon sand, and worst of all upon mud. Neither may you trust waters that taste sweet, for they are commonly found in rising grounds of great cities, which must needs take in a great deal of filth."

The situation of the house and the conditions which may affect the air, &c., are referred to in his essay of "Building." Here we read: "He that builds a fair house upon an ill seat committeth himself to prison. Neither do I consider it an ill seat only where the air is unwholesome; but likewise where the air is unequal; as you shall see many fine seats set upon a knap of ground environed with higher hills round about it, whereby the heat of the sun is pent in, and the wind gathereth as in troughs, so as you shall have, and that suddenly, as great diversity of heat and cold as if you dwelt in several places. Neither is it ill air only that maketh an ill seat, but ill ways, ill markets, and if you will consult with Momus, ill neighbours. I shall not speak of many more; want of water, want of wood, shade and shelter, want of fruitfulness and mixture of ground of several natures, want of prospect, want of level grounds, want of places for sports, &c. . . . having the commodity of navigable rivers, or the discommodity of their overflowing."

It is interesting to notice that in the "New Atlantis," which is supposed to have suggested the foundation and programme of our own Royal Society, Bacon attempts to picture an ideal institution under the designation of Solomon's house. In the description of this fair commonwealth, among other means for the prevention and cure of disease the father of the house adds: "We have also certain chambers which we call Chambers of Health where we qualify the air as we think good and proper for the cure of divers diseases and preservation of health." Under this head Mr. Spedding in the year 1857 makes the following note: "This experiment has been tried, especially by Dr. Beddoes, of Clifton, but without any marked result. Some relief has been obtained in cases of phthisis by inhaling oxygenated air." In this "New Atlantis" there are also provided "fair and large baths of several mixtures, for the cure of diseases and the restoring of man's body from arefaction; and others for the confirming of it in strength of sinews, vital parts and the very juice and substance of the body. . . . We have also helps for the sight far above spectacles and glasses in use. We have also glasses and means to see small and minute bodies perfectly and distinctly, as the shapes and colours of small flies and worms, &c., observations in urine and blood, not otherwise to be seen. We represent also all manner of reflections, refractions and multiplication of objects." Spedding very appropriately observes that "Nothing that has been accomplished with the microscope would have interested Bacon more than the discoveries of Schleiden and Schwann."

It would, indeed, almost seem that to Bacon's keen insight was added the gift of prophecy. This "New Atlantis" is a wonderfully suggestive study, and its perusal will amply repay any thoughtful reader. In many of his *essays* Bacon frequently takes the opportunity of introducing subjects which bear directly and indirectly on general and personal hygiene. I would direct your attention to that on "Regimen of Health," and I need only quote two or three passages from it. He says: "A man's own observation, what he finds good of, and what he finds hurt of, is the best physic to preserve health. . . . Discern of the coming on of years, and think not to do the same things still; for age will not be defied. . . . Beware of sudden change in any great point of diet, and, if necessary, enforce it, fit the rest to it. . . . Examine thy customs of diet, sleep, exercise, apparel, and the like, and try in anything thou shalt judge hurtful to discontinue it by little and little. . . . To be free-minded and cheerfully disposed at hours of meat, and of sleep and of exercise, is one of the best precepts of long-lasting. . . . Despise no new accident (he means any striking change in the constitution) in your body, but ask opinion of it" (that is take medical advice). He quotes Celsus in this discourse as to how a man may best direct his own health, but I must refer you to the essay itself. In the essay on "True Greatness of Kingdoms and Estates" we find the subject of *exercise* again discussed. He adds here: "No body can be healthful without exercise." In that on *studies* also we read: "Abeunt studea in mores" (studies become habits). "Nay there is no stond" (that is, hindrance), "or impediment in the wit, but may be wrought out by fit studies, like as diseases of the body may have appropriate exercises. Bowling is good for the stone and reins" (that is, kidneys). "Shooting for the lungs and breast; gentle walking for the stomach; riding for the head and the like. . . . Every defect of the mind may have a special receipt." Again in his item on *ceremonies and respects* he says: "A wise man will make more opportunities than he finds. Men's behaviour should be like their apparel, not too straight or point device, but free for exercise or motion." In that of *dispatch*: "Affected dispatch is one of the most dangerous things to business that can be. It is like that which physicians call *predigestion*, or hasty digestion, which is sure to fill the body full of crudities and secret seeds of diseases." Speaking of *friendship*, and the abuses often arising from false advice, he says: "We may have counsel given hurtful and unsafe (though with good meaning) and mixed partly of mischief and partly of remedy; even as if you would call a physician that is thought good for the cure of the disease you complain of, but is unacquainted with your body; and therefore may put you in a way for present cure, but overthroweth your health in some other kind; and so cure the disease and kill the patient."

Bacon's allusions to Food and Nutrition are not infrequent, and he takes many opportunities of stating his views regarding *affinity* and *assimilation*. In more than one place he attempts to explain the *process of nutrition*, coupled with a comparative study of animals and plants, and in this connexion I may quote one passage from the "Novum Organum," where he says: "The solid parts of plants and animals as the leaf, flower, the flesh, bone, and the like, each of them assimilate some part of the juices contained in their food, and generate a successive and daily substance. For let none rave with Paracelsus who (blinded by his distillations) would have it that nutrition takes place by mere separation, and that the eye, nose, brain, and liver lie concealed in bread, meat, &c., asserting that just as the artist brings out a leaf, flower, eye, nose, hand, foot, from a rude mass of stone or wood by the separation and rejection of what is superfluous, so the great Artist within us brings out our several limbs and parts by separation and rejection. But to leave such trifling, it is most certain that all the parts of vegetables and animals, as well the homogeneous as organic, first of all attract juices contained in their food, which are nearly common, or at least not very different, and then assimilate them and convert them into their own nature. Nor does this assimilation or simple generation take place in animated bodies only, but the inanimate also participate in the same property."

In his "Historia Ventorum," Bacon discusses the origin, directions, humidity and dryness of winds, and also explains how natural ventilation in a house may be produced. Allow me to quote one passage from this work: "Sea winds are doubtless moister than land winds, but yet purer, and more easily and equally mixed with pure air. For land winds are compounded of deleterious mixtures, and are full of smoke. And let no one oppose to this, that sea winds must be heavier by reason of the saltness of the sea; for salt being in its nature terrestrial does not rise in vapours. Sea winds are warm or cold, according as they are moist or pure. Cold is lessened by humidity (for dryness intensifies both heat and cold) but increased by purity. . . . All winds clear the air and free it from corruption, so that those are the healthiest years in which there is most wind."

With respect to the comparative frequency of diseases at different seasons of the year, I find several important allusions in the "Sylva Sylvarum"; I need only quote one: "It is commonly seen that more are sick in the summer and more die in the winter; except it be pestilent diseases, which commonly reign in summer and autumn. The reason is, because diseases are bred chiefly by heat; but then they are cured most by sweat and purge, which in the summer is provoked more easily. . . . The general opinion is, that years hot and moist are most pestilent, upon the superficial ground that heat and moisture cause putrefaction." He then speaks of tainted waters and how they are rendered less wholesome.

Bacon's allusions to the *general diseases* of the body are frequent, and although he refers to them from almost every standpoint, and displays his wisdom in many forms of expression, as we have already seen, I will select only a few words which exhibit him in a somewhat lighter vein, but not the less pertinent and interesting. In his "Apophthegms" he writes: "In sickness there are three things that are material; the physician, the disease, and the patient. If any of these join then they have the victory. If the physician and the patient join, then down goes the disease. If the physician and the disease join, then down goes the patient. If the patient and the disease join, then down goes the physician; for he is discredited." In the same treatise he wittily relates an experience, not too complimentary to the profession, which is worth quoting: "There was a gentleman fell very sick, and a friend of his said to him, 'Surely you are in danger, I pray send for a physician.' But the sick man answered, 'It is no matter, for if I die, I will die at leisure.'"

It may not be out of place here to record an observation, which is found in his essay on "Empire," especially interesting on account of the reference to the circulation of the blood. Speaking of merchants in this essay, he adds, "they are the *Vena Porta.*" This anatomical allusion occurs several times in Bacon's works, as in the "History of Henry VII," where he says: "Being a king that loved wealth and treasure he could not endure to have trade sick, nor any obstruction to continue in the gate-vein which disperseth that blood."

Mr. Ellis writes that "the metaphor is historically curious; for no one would have used it since the discovery of the circulation of the blood and of the lacteals. But in Bacon's time it was supposed that the chyle was taken up by the veins which converge to the *vena porta.* Bacon's meaning is that commerce concentrates the resources of a country in order to their distribution."

We find Bacon referring to this view again in his "Track on Transmutations" to this effect: "The slime about the reins (that is, the kidneys) and bladder in man's body turns into stone, and stone is likewise found often in the gall, and sometimes, though rarely, in *vena porta!*"

With regard to *mental disease,* we shall find but few direct allusions in the works of Bacon. Turning to the "Advancement of Learning" we read: "It were too long to go over the particular remedies which learning doth minister to all the diseases of the mind, sometimes purging the ill-humours, sometimes opening the obstructions, sometimes helping the digestion, sometimes increasing appetite, sometimes the wounds and exculcubations thereof."

In his "Sylva Sylvarum" he refers specially to leprosy, hydrophobia, and various infectious diseases, and it is interesting to notice that he includes "consumptions of the lungs" among them, which, as he explains, "taint the breath and pass manifestly from man to man." In the same treatise he attempts to enumerate the channels through which infectious diseases are communicated from man to man. It is quite evident that during the reign of Henry VII there was an unusual epidemic of *plague,* or what was known in the fourteenth century as Black Death; for in Bacon's admirable history of that reign he directs special attention to it in the following lines: "This fifteenth year of the King" (this would be 1499) "there was a great plague both in London and in divers parts of the Kingdom. Wherefore the King after often change of places, whether to avoid the danger of the sickness, or to give an interview with the Archduke, or both, sailed over with his Queen to Calais," &c.

In the "Sylva Sylvarum" there is evidence of Bacon's acquaintance with early medical literature, and he also shows us that he had directed his inquiries with reference to the cure of malignant growths. "Galen," he says, "speaketh of the curing of the scirrus of the liver, by milk of a cow that feedeth upon certain herbs." In referring to Spedding's notes on this passage, I find he says: "Galen in several places speaks of the medicinal qualities which milk may derive from the herbs on which the cow fed, but I have not found the passage to which Bacon appears to refer." What Spedding has been unable to trace, possibly some of you have already noticed. In the "Sylva" you will also find references to various involuntary acts and other phenomena such as yawning, hiccough, sneezing, sighing, groaning, screaming, grinding of the teeth, blushing, laughing. He also attempts to describe the modes of operation and effects of the passions of the mind: likewise drunkenness, lassitude, &c. In this book he also makes special reference to the *teeth* and sums the matter up thus: "Concerning the teeth these things are to be considered: (1) The preserving of them, (2) the keeping of them white, (3) the drawing of them with least pain, (4) the staying and easing of the toothache, (5) the binding in of artificial teeth, (6) restoring teeth in age." Besides these there are many short references to "Diseases: their Management and Treatment," throughout his books; for instance: "Wounds cannot be cured without searching." . . . "As for the just cure, it must answer to the particular disease, and so be left to counsel rather than rule"—both remarks being taken from the Essays.

The consequences of malpractices in the surgeon are referred to in Bacon's "Maxims of the Law." I need only quote one passage from this: "If a surgeon authorized to practise do, through negligence in his cure, cause the party to die, the surgeon shall not be brought in question of his life; and yet, if he do only hurt the wound, whereby the cure is cast back and death ensues not, he is subject to an action upon the case for his misfeasance." I hope we may presume that the meaning of this was to consider the liability where there was *intention* to "hurt the wound," else the surgeon must have been frequently condemned.

Bacon was well aware of the possibility of establishing a *toleration* with regard to certain poisons, and also had a fairly clear conception of what we now understand by the term "*immunity*." I must refer you to a passage in the "Sylva Sylvarum" illustrative of this. He says: "There is a secret way of cure (unpractised) by assuetude of that which in itself hurteth. Poisons have been made by some, familiar as hath been said." He refers to the case of Mithridates and the attempt made to poison Alexander. "Ordinary keepers of the sick of the plague are seldom infected. Enduring of tortures by custom, hath been made more easy. . . . Generally, diseases that are chronical, as coughs, phthisis, some kinds of palsies, lunacies, &c., are more dangerous at the first. Therefore a wise physician will consider whether a disease be incurable, or whether the first cure of it be not full of peril; and if he find it to be such, let him resort to palliation, and alleviate the symptom without busying himself too much with the perfect cure; and many times (if the patient be indeed patient) that course will exceed all expectation. Likewise the patient himself may strive by little and little to overcome the symptom in the exacerbation, and so by time, turn suffering into Nature."

MEDICINES AND SPECIAL MEDICAL APPLICATIONS.

Method was Bacon's watchword. In every department this keen appreciation of detail and careful arrangement of facts are evident. Alluding to "Medicining of the body" in the "Advancement of Learning," he says: "It is in order first to know the divers complexions and constitutions; secondly, the diseases, and lastly, the cures." Among his numerous experiments, chemical and otherwise, he made a special study of what he termed "commixture of liquors," and in his tract on "Transmutations," he states his conclusions. To give an idea as to the nature of such experiments I may quote a few lines from this work: "Dissolution of gold and oil of vitriol commixed, a dram of each, gathereth a great heat at the first, and darkeneth the gold and maketh a thick yellow. . . . Oil of vitriol and dissolution of quicksilver, a dram of each, maketh an extreme strife and casteth up a very gross fume, and after, casteth down a white kind of curds and on the top a slimish substance, and gathereth a great heat. . . . One ounce of blood and one ounce of milk do easily incorporate." Then, again, in the "Physiological Remains" other experimental results are published. Under *calcination* he says: "All metals may be calcined by strong waters, or by admixture of salt, mercury and sulphur. The imperfect metals may be calcined by continuance of simple fire; iron thus calcined is called Crocus Martis. Gold and silver are best calcined by mercury. Their colour is grey. Lead calcined is very red. Copper dusky red. Metals are *sublimid* by joining them with mercury or salts. As silver with mercury, gold with sal ammoniac, mercury with vitriol." He continues this discourse by referring to precipitation, amalgamation, vitrification, and dissolution. Under the last head he says: "All metals without exception may be dissolved," and he then proceeds to enumerate a large number of experiments in a variety of metals and the solutions necessary to dissolve them. In this connexion, too, he speaks of reduction and volatility.

Bacon thoroughly grasped the manner of applying medical remedies, according to the tenets of his own day, and very often his advice, whether given directly or by quaint metaphor, was in advance of contemporary professional opinion. In his "History of Henry VII," speaking of the attitude of Perkin Warbeck in trusting more to his friends within the realm than to foreign arms, we read: "It behoved him to apply the remedy where the disease lay, and to proceed with severity against some of the principal conspirators here within the realm. . . The Lord Chamberlain was not touched, whether it were that the King would not stir too many humours at once, but after the manner of good physicians purge the head last." In the same history his reference to *bleeding* is in the same vein: "The King commonly drew blood as physicians do rather to save life than to spill it, and was never cruel when he was severe." You will find a reference to *cupping* in the "Novum Organum," under what Bacon terms the "Motion of Connexion," whereby, as he says, "bodies do not allow themselves to be separated at any point from contact with another body." "This is called by the schools a motion to prevent a vacuum. It takes place when water is drawn up by suction or a syringe, the 'Flesh by Cupping.'" He also describes here the solubility of bodies under the term "Motion of Acquisition," or the "Motion of Need," and he explains in a very interesting manner how various substances may be selected or acquired by liquids and air.

From a passage which occurs in the "Sylva Sylvarum" it is evident that Bacon conceived the idea and therapeutic value of *massage;* for, referring to the nourishment of emaciated bodies, he observes that "gentle frication draweth forth the nourishment by making the parts a little hungry and heating them, whereby they call forth nourishment the better. This frication I wish to be done in the morning. It is also best done by the hand, or a piece of scarlet wool, wet a little with oil of almonds, mingled with a small quantity of bay-salt or saffron. We see that the very currying of horses doth make them fat and in good liking." And he says again, "Some outward emolients make the parts more apt to assimilate."

In recalling the actions of different medicines, &c., we find much observation and discrimination: for instance, where he suggests "The point of the first and the last should be observed in all natural actions: thus in an infusion of rhubarb, the purgative property is first extracted and then the astringent. We have experienced something of the same kind in steeping violets in vinegar, which first extracts the sweet and delicate odour of the flower, and then the more earthy part, which disturbs the perfume."

Again, in the "Sylva Sylvarum" we read: "Rhubarb hath manifestly in it parts of contrary operations: parts that purge, and parts that bind the body: and the first lie lower, and the latter lie deeper: so that if you infuse rhubarb for an hour and crush it well, it will purge better, and bind the body less after the purging, than if it stood twenty-four hours. But I conceive likewise that by repeating the infusion of rhubarb several times, letting each stay in but a little time, you will make it as strong a purging medicine as scammony. And it is not a small thing in physic if you can make rhubarb and other medicines that are benedict, as strong purgers as those that are not without some malignity." He discusses purgation generally and the manner of operation of various remedies in this class, for the details of which I must refer you to the "Sylva Sylvarum."

Under this head allow me to quote a few lines from his essay on "Friendship." "A principal fruit of friendship is the ease and discharge of the fulness and swellings of the heart, which passions of all kinds do cause and induce. We know diseases of stoppings and suffocations are the most dangerous in the body, and it is not much otherwise in the mind: you may take sarza to open the liver, steel to open the spleen, flowers of sulphur for the lungs, castoreum for the brain; but no receipt openeth the heart, but a true friend to whom you may impart griefs, joys, fears, hopes, suspicions, &c."

He seems to have made a very careful study of the action of various *opiates*. In the "Novum Organum," for instance, he endeavours to explain how they expel the "spirits contained in the ventricles of the brain, but in smaller doses, and in moderation by a secondary action, strengthen the spirits, rendering them more robust, and thus contribute not a little to the cure of diseases and the prolongation of life." Again, in a reference to *opium* itself, he says: "The Greeks imputed much to opium, both for health and prolongation of life, but the Arabs still more, so that their higher medicines (which they call 'God's Hands') have opium for their basis and principal ingredient, with a mixture of other things to correct the noxious crudities thereof, such as treacle, mithridate and the like." *Tobacco*, he says, "has immensely increased of late. It tends, no doubt, to relieve the body and remove weariness. It is a kind of henbane, and manifestly affects the head, as all opiates do." "Simple opiates are called narcotics"—and in this class he mentions seed of the poppy, henbane, tobacco, and nightshade. Tenison, in his "Baconiana," collected a number of Bacon's "Medical Receipts." These compounds, which were intended to relieve various affections, included elder, marigold, thyme, cream of tartar, mallows, camomile, &c., but for the details of this study I must refer you to the work itself.

Without reciting all the mixtures and remedies which Bacon suggests, it may be interesting to notice what he himself found useful in *gout*, and he details this information in the "Sylva Sylvarum" as follows: "There be many medicines, which by themselves would do no cure, but perhaps hurt; but being applied in a certain order, one after another, do great cures. I have tried (myself) a remedy for the gout, which hath seldom failed, but driven it away in twenty-four hours' space; it is first to apply a poultice, of which *vide* the receipt; and then a bath or fomentation, of which *vide* the receipt; and then a plaister, *vide* the receipt." These receipts are not found in the original issue of the work, but were inserted on a separate leaf at the end of the second edition in 1635. In order they are: (1) The *poultice:* "Of manchet about 3 oz., the crumb only, thin cut. Let it be boiled in milk till it grow a pulp. Add in the end a dram and a half of the powder of red roses. Of saffron ten grains. Of oil of roses an ounce. Let it be spread upon a linen cloth and applied luke-warm, and continued for three hours' space." (2) The *fomentation:* "Of sage-leaves half an handful. Of the root of hemlock sliced 6 drams. Of briony roots half an ounce. Of the leaves of red roses two pugils. Let them be boiled in a pottle of water, wherein steel hath been quenched, till the liquor come to a quart. After the straining, put in half an handful of bay-salt. Let it be used with scarlet cloth or wool, dipped in liquor hot, and so renewed seven times; all in the space of a quarter of an hour, or a little more." (3) The *plaister:* "Emplastorum diacalciteos, as much as is sufficient for the part you mean to cover. Let it be dissolved with oil of roses, in such a consistence as will stick, and spread upon a piece of holland and applied." After this he continues to explain how each application acts and the precautions that are necessary.

In his treatise on "The Wisdom of the Ancients" he plainly shows us that the phenomenon of *radiant energy* has not escaped him. Take the following passage: "The body of Nature is most elegantly and truly represented as covered with hair: in allusion to the rays which all objects emit; for the rays are like the hairs and bristles of Nature; and there is scarcely anything which is not more or less radiant. This is very plainly seen in the power of vision, and not less so in all kinds of magnetic virtue, and in every effort which takes place at a distance. For whatever produces an effect at a distance may be truly said to emit rays."

THE SPECIAL SENSES.

As illustrating Bacon's views respecting *taste* and *smell* and their relation to each other, an interesting passage occurs in the "Novum Organum," which runs as follows: "Those who do not smell, but are deprived by Nature of that sense, do not perceive or distinguish rancid or putrid food by their taste. Again, those whose nostrils are obstructed by accident (such as cold) do not distinguish any putrid or rancid matter from anything sprinkled with rose water. If those who suffer from cold blow their noses violently at the very moment in which they have anything fetid or perfumed in their mouth, or on their palate, they instantly have a clear perception of the fetor or perfume. These instances offer and constitute this species or division of taste; namely, that it is in fact nothing else than an internal smelling, passing and descending through the upper passages of the nostrils to the mouth and palate. But on the other hand, those whose power of smelling is deficient, or obstructed, perceive what is salt, sweet, pungent, acid, rough and bitter, as well as anyone else. So that the taste is clearly something compounded of the internal smelling, and an exquisite species of touch, which we will not here discuss." Later, under the same thesis, he discusses *sensation*, comparing this in the animated body with the "motions" in the inanimate. To show the manner in which he approaches this portion of the subject, I may quote a sentence or two. "There must be many more motions in the inanimate bodies than senses in the animated, from the small numbers of organs of sense. A very plain example of this is afforded by pains. For, as animals are liable to many kinds and various descriptions of pains (such as that of burning, of intense cold, of pricking, squeezing, stretching and the like), so it is most certain that the same circumstances, as far as motion is concerned, happen to inanimate bodies, such as wood, stone when burnt, frozen, pricked, cut or bruised, though there be no sensation owing to the absence of animal spirit."

The subjects of *sight and touch* are also considered in the "Novum Organum," and those who wish to understand Bacon's method and treatment of the special senses will be interested and repaid by a perusal of that portion of the work which deals with them. Before leaving this part of our subject, however, there are some references he makes as to *sight*, and as they include his observations with regard to the use of the *microscope*, it may be interesting specially to note them. He says: "It is obvious that sight holds the first rank among the senses, with regard to information, for which reason we must seek principally helps for that sense. These appear to be threefold: either to enable it to perceive objects not naturally seen; or to see them from a greater distance; or to see them more accurately and distinctly. We have an example of the first (not to speak of spectacles, and the like, which only correct and remove the infirmity of a deficient sight, and therefore give no further information) in the lately invented microscopes, which exhibit the latent and invisible minutiæ of substances and their hidden formation and motion, by wonderfully increasing their apparent magnitude. By this assistance we behold with astonishment the accurate form and outline of a flea, moss, and animalculæ, as well as their previously invisible 'colour and motion.'" Under the same subject a little later he remarks: "Men have (as is usual in new and wonderful discoveries) added a superstitious remark, that the microscope sheds a lustre on the works of Nature, and dishonour on those of art; which only means that the tissue of Nature is much more delicate than that of art. For the microscope is only of use for minute objects, and Democritus, perhaps if he had seen it, would have exulted in the thought of a means being discovered for seeing his atom, which he affirmed to be entirely invisible." Then, as showing the limitations of these early microscopes, let us notice another word which he adds: "But the inadequacy of these microscopes for the observation of any but the most minute bodies destroys their utility. For if the invention could be extended to greater bodies, so that the latent minutiæ and irregularities of liquids, urine, blood, wounds, and many other things be rendered visible, the greatest advantage would without doubt be derived." These words have a special interest; for they plainly show not only that Bacon conceived greater possibilities for the microscope, but also that he was capable of suggesting the lines on which scientific observation should be conducted.

Generation, Decay and Death.

In his ceaseless investigations of the phenomena of Nature, both in plants and animals, Bacon frequently turned his attention to such physical conditions as heat, cold, putrefaction, &c. In one place we find him expressing himself thus: "All putrefaction exhibits some slight degree of heat, though not enough to be perceptible by the touch."

"Animals become warm by motion and exercise, wine and feasting, venery, burning fevers, and grief. In the paroxysm of intermittent fevers the patients are at first seized with cold and shivering, but soon afterwards become more heated than at first; in burning and pestilential fevers they are hot from the beginning." And he continues by a comparative study of the heat of man and that of the lower animals. In another place he adds: "With regard to heat, man possesses abundant means and power; but his observation and inquiry are defective in some respects, and those of the greatest importance, notwithstanding the boasting of quacks." Questions on the regulation of plants and the organization of animals had a special fascination for him. We find him expressing himself thus: "If we would observe the hatching of eggs, we would easily see the process of animation and organization, and what parts are formed of the yolk and what of the white of the egg." He adds: "The same may be said of the inquiry into the formation of animals from putrefaction; for it would not be so humane to inquire into perfect and terrestrial animals, by cutting the fœtus from the womb; but opportunities may perhaps be offered of abortions, animals killed in hunting, and the like. . . . Contemplations of this kind may be considered as carried on by night, from the minuteness and perpetual "burning of our Watch-light." In another place he refers to Telesius attributing the formation of animals to the "Channels and folds of the womb," and Bacon adds that he ought to have observed a similar formation in the young in eggs, "which have no wrinkles or irregularities." One is impressed by the keen observation displayed by Bacon in such matters, and by the important suggestions which he offers. Nor is he ignorant of the experiences of those who preceded him in experimental research.

In the "Sylva Sylvarum" Bacon devotes a section to explaining the cause of gangrene and "mortification by cold," and he suggests the necessary precautions and treatment indicated. One may fairly say that the advice he gives is rational and in accord with present-day usage, more especially as it refers to the treatment of gangrene due to intense cold and frost prevalent in some climates.

In his essay of "Death" he says: "Many times death passeth with less pain than the torture of a limb, for the most vital parts are not the quickest of sense." Then he quotes from Seneca: "Pompa mortis magis terret, quam mors ipsa" (It is the accompaniments of death that are frightful rather than death itself). It is worthy of observing that there is no passion in the mind of man so weak that it mates and masters the fear of death. Revenge triumphs over death; Love slights it; Honour dispiseth it; Grief flieth to it; Fear preoccupieth it. . . . It is as natural to die as to be born, and to a little infant, perhaps, the one is as painful as the other. He that dies in an earnest pursuit is like one that is wounded in hot blood; who for the time scarce feels the hurt, and therefore a mind fixed and bent upon somewhat that is good doth avert the dolours of death." In his beautiful memoir of Queen Elizabeth, entitled "In Felicem Memoriam Elizabethæ," he thus describes her last illness: "For a few days before her death, by reason of the exceeding dryness of her body, wasted as it was by the cares of government, and never refreshed with wine or a more generous diet, she was struck with paralysis; and yet she retained her powers of speech (a thing not usual in that disease) and of mind and of motion; only somewhat slower and duller. And this state of body lasted a few days, as if it were less like the last act of life than the first step to death. For to continue long alive with the faculties impaired is a miserable thing; but to have the sense a little laid asleep, and so pass quickly to death, is a placid and merciful period and close of life."

In his memorial of Henry Prince of Wales, we find these concluding remarks with reference to his death: "He died in the nineteenth year of his age of a malignant fever, which — springing from the great heats and droughts, greater than islanders are accustomed to—was very general among the people during the summer, though few died of it; but became towards the autumn more fatal. Rumour, even more malignant (as Tacitus says) upon the death of princes, suggested poison. But as no symptoms of such a thing appeared, especially in the stomach, which is commonly most affected by poison, that report soon died away."

One may add here, that in Bacon's own death we have, as it were, the very reflection of what lay nearest his heart—viz., the advancement of scientific methods of research; for you will remember that it was the result of an experiment to prove the preservative action of intense cold on animal bodies.

In the limited time at our disposal it is obvious that only a hasty résumé of Bacon's medical allusions is possible, and indeed, to include fully all such references would constitute a volume of considerable dimensions. Though his works are available to all, I trust the indications I have given may assist those who are wishful to undertake a more extended review.

I think we may conclude that a consideration of his observations may be useful in assisting us to estimate the standing and accomplishments of the medical men of his period, and they may also possibly enhance our admiration for one of our greatest Englishmen.

Section of the History of Medicine.

March 5, 1913.

Sir WM. OSLER, Bt., F.R.S., President of the Section, in the Chair.

A New Egyptian Medical Papyrus.

By JOSEPH OFFORD.

SOME few years ago an expedition of United States explorers under the conduct of Dr. Reissner was excavating in Egypt, with funds provided by Mrs. Sophie B. Hearst, on behalf of the University of California. The debris from the trenches, or tunnels, into the mounds was of value to the fellahin as a fertilizer for their fields, and permission was given them to take what they wished of it. Because of this gift to him of "sebakh" one of the peasants presented to the party a papyrus he had found when digging for the same material some years previously. Upon unrolling the manuscript it was found to be almost complete, and gave some eighteen columns of fairly legible hieratic writing. This, for an Egyptian papyrus, comparatively long text, contained a medical work similar in character, as will be seen, to the famous Berlin and Ebers papyri. For paleographic reasons it may be assigned to about the same age as the Ebers manuscript, that is to say, at a time previous to the reign of Amenophis I, somewhere between the twelfth and eighteenth dynasties.[1] The writing is all in black ink with the exception of the prescription headings, and some quantity figures for ingredients, which are in red.

The "Hearst Papyrus," as it will henceforth be entitled, whilst presenting to us a compendium of remedies for diseases, the majority of which, allowing for minor alterations, are almost identical with those of the Ebers papyrus, is not a copy of the same treatise. A careful comparison soon indicates that each work contains matter not present in the other. But they are so far alike that Dr. Reissner has not, at present, published the Hearst Papyrus in extenso in translation, but has been content to give photographic facsimiles of the text, and to indicate the parallelism between it and the Ebers manuscript. He also edits in full the magical incantations which are new to us, and adds a glossary of words found in this fresh text.

---

[1] 2400—1600 B.C.

The close connexion between the Hearst and Ebers treatises is the most important fact concerning them, for not only are many prescriptions the same in each, but they are arranged in groups much alike in their contents concerning certain parts of the body, or of allied maladies, and these are similarly grouped in both texts, thus conclusively proving some common origin for them. These groups, however, though almost identical in their own arrangement, do not appear in quite the same order of position in the two manuscripts. Sometimes also prescriptions in the Hearst text, identical with those in the Ebers, are inserted under a different heading. Occasionally also the same headings in the two works are followed by varying ingredients for cure. All the differences however are small compared with the similarities, and that the two documents are based upon a common source, or sources, is proved because both papyri give duplicate copies of the same paragraphs for certain remedies. This interesting fact indicates the true nature of both works as we now have them: they are copies in full, or extracts from previous collections of medical and magical formulæ. Hence if two, or more, of these earlier lists contained the same remedies, they became embodied in these two compendiums more than once. This view of the origin of the Ebers text was that of Professor Ebers himself and is now confirmed by the recovery of the Hearst variant work. The Ebers scribe vaunted that some of his prescriptions were derived from books stored in special temples, or from works of certain physicians. The Hearst writer makes no such claim for his collection. His text does, as does the Ebers, assert that several of its remedies were of divine origin, chiefly those concerned with the urinary organs. One of these was advised by the deity SHU for himself, another was made by TEFNUT for the healing of RA. This god also had been benefited by cures concocted by NUT and ISIS. One special one is given by the latter, as beneficial for the head. Another cure of a disease not yet identified is said, by the Ebers writer, to have been given him by a Semitic man of Khephren, and it is repeated in the Hearst series.

The possession of the two manuscripts with their differences and divergencies probably decides the question as to whether they may be considered to represent one of the great hermetical medical compendiums that Clement of Alexandria tells us were kept in the larger temple libraries. He says that out of the thirty-six books, or rather encyclopædias, of various subjects guarded there, "six treated of medicine"—that is to say, of the "structure" of the body and of its maladies; of the "organs" and their remedies, of the eyes, and of the female organs.

The character of these two recently found works, and also of the other Egyptian medical papyri we yet possess, however, contradicts our accepting them as a specimen of the hermetic temple books; unless the sacred scribes worked very carelessly, which is unlikely. As mentioned, some of the formulæ appear twice over; many of the groups of recipes, and chapters too, are differently arranged. Had their archetype text emanated from a sacred library, or been copied by sacred scribes, all their dissimilarities would have been done away with. Moreover, could the scribe of either of them have asserted that the work was a divine hermetic temple certificated work, no attempt to augment the authority of individual remedies by ascription of them to specified deities need have been made. The whole would have been divine, and so amply authenticated.

Neither of the two papyri claim that their contents as a whole were inspired, nor were their scribes when writing them evidently working as embued with such an idea. The reference in Ebers to the God THOTH does not claim his authorship for the collection, but merely states he was the deity of medicine, or of medical men. Hence the divergencies in both the matter itself and the order of its engrossment; each scribe just wrote as suited his convenience, or copied the text of a previous scribe who had done so. Or, if each of them compiled his work for himself from several series of shorter formulæ, he arranged them as suited him best, or as they happened to be before him.

By the time of Clement the contents of these two works may have been, with better arrangement, absorbed into one of the temple-kept medical works. It would appear then, that at the time when these two manuscripts were written, the recorded medical knowledge of Egypt consisted of compilations of a number of collections of prescriptions. In one sense perhaps sacred, from having been made up from the formulæ of physicians practising at curative shrines. At these sites, in earlier times, they had probably been bequeathed verbally from generation to generation, as empirical lore relating to aphrodisiacs is still handed down by Kaffir and Negro "medicine men" at the present day. Some of the chapters, however, may merely be the recipes of an ordinary, that is to say, not a sacerdotal physician, and the collection thus comprises the notes of a practitioner, and also the, in some cases, cures acquired from abroad by travellers.

The Hearst papyrus came from a ruined house in a small provincial town, and so was probably an inexpensive copy (for the text says that it was copied) of the then common medical treatise possessed by a country doctor. It is less carefully compiled than the Ebers papyrus, but then that was found at the great Metropolis of Thebes, and perhaps was a more costly production, and though only a rough book of reference was for a wealthier owner. As we have said, neither of them were very perfectly produced, but that does not prove that contemporary with them better editions may not have been, rarely, in existence. But it does tend to show, although one was alleged to have been found in a temple, that they are not copies of a work treasured there, and both the Berlin and Hearst manuscripts are apparently cheap ones for a doctor's daily use.

It is curious that whilst indications separating the work into chapters are provided in Ebers, only one chapter, numbered as the eighth, is specified in Hearst. Guided by the first papyrus, Dr. Reissner has attempted separating the second into chapters, as far as possible parallel to those in Ebers. The traces of a plan to group together in batches remedies for some special bodily members, or parts, such as the eyes, female organs, head, and hair, skin, and urinary organs, is quite apparent in both works. But in the Hearst text, what may be termed specific and infectious diseases are put together in what Dr. Reissner labels Chapter XII. Nearly all the ailments of this section are yet unidentified. One of them is a so-called Semitic disease.

The chief novelties in the Hearst manuscript are prescriptions relating to diseases of the fingers and toes, also three methods for "uniting a bone" upon the first day; and some for curing the bites of animals. The question naturally arises, Does the new papyrus show any further possession of true medical knowledge than do those previously known? and the answer is decidedly in the negative. Indeed the scribe appears to have depended more upon the magic arts for cure, as there is a greater proportion of incantations in this work than in the others. Still no idea of even the fact of contagion is apparent in any ancient Egyptian medical book. All pains, aches, and symptoms were caused by the gods, or evil spirits, and subject to cure by divine assistance. So all remedies had to be prepared with due recitals of the proper form of words, and when applied, assisted again by verbal charms; even the weighing or measuring of the ingredients must be made potent in the same fashion, and the Hearst papyrus gives us the protective talismanic sentences proper to recite when taking out for use the liquid measure called "dbh." Another verbal charm is that "to accompany any healing" draught, "a third" for "appliance with any bandage"; whilst one of apparently universal utility was "for any remedy." Whilst magic was thus allied with medicine as curative, vice versa, medicine might counteract the effects of malicious magic; for a disease so imposed could be eliminated by a recipe composed of soda, dates, hair, fruit, incense, and beer, well mixed and imbibed.

From these triple—Berlin, Ebers, and Hearst—papyri, supplemented by others less complete, we see that the diagnosis of early Egyptian physicians was very primitive indeed, and only guided by the region and extent of the pain and general appearance. Cures were effected by combined enchantments and prescriptions, the latter, as far as we can yet detect, not founded upon any real scientific knowledge of the cause of the suffering, or decay, nor by much pharmaceutical wisdom; the duplicate means of cure were, apparently, deemed to be equally efficacious. But though the medicine's potency was thought to be meagre, minus the magic, by the multitude, yet the priestly physicians may have, among themselves, valued the latter merely as an assistant, by means of auto-suggestion, in the patient's recovery. At all events the curative ingredients, unless positively injurious, plus the incantations, were more likely to succeed than the so-called "Christian Science" without the medical art, of to-day. Perhaps too if the physician did not possess the secret successful magic formulæ, and use them, the fees would have been less freely forthcoming.

It is to be regretted that the Hearst text is to such a considerable extent duplicate of the Ebers papyrus, but it shows us that as remedies and enchantments obtained a celebrity as having been effective, they were recorded in books. Firstly in small lists of such matters; and then these were collected together into larger summaries, such as the three papyri we have considered. We have then in these manuscripts probably the cures advised by several medical men for their patients for various common diseases.

The Hearst papyrus has not met, at present, with the notice it deserves, but it will now be preferable to postpone a complete edition of the medical papyri until the one written in Coptic, in possession of the French Archæological School at Cairo, is published by its editor, M. Chassinat.

The curious nature of the old recipes is compared by Dr. Reissner with those used to-day among the ignorant fellahin; to these should now be added a list just published by Captain Stanley, R.A.M.C., in his report upon the Oasis of Siwa.

Restrictions concerning Circumcision under the Romans.

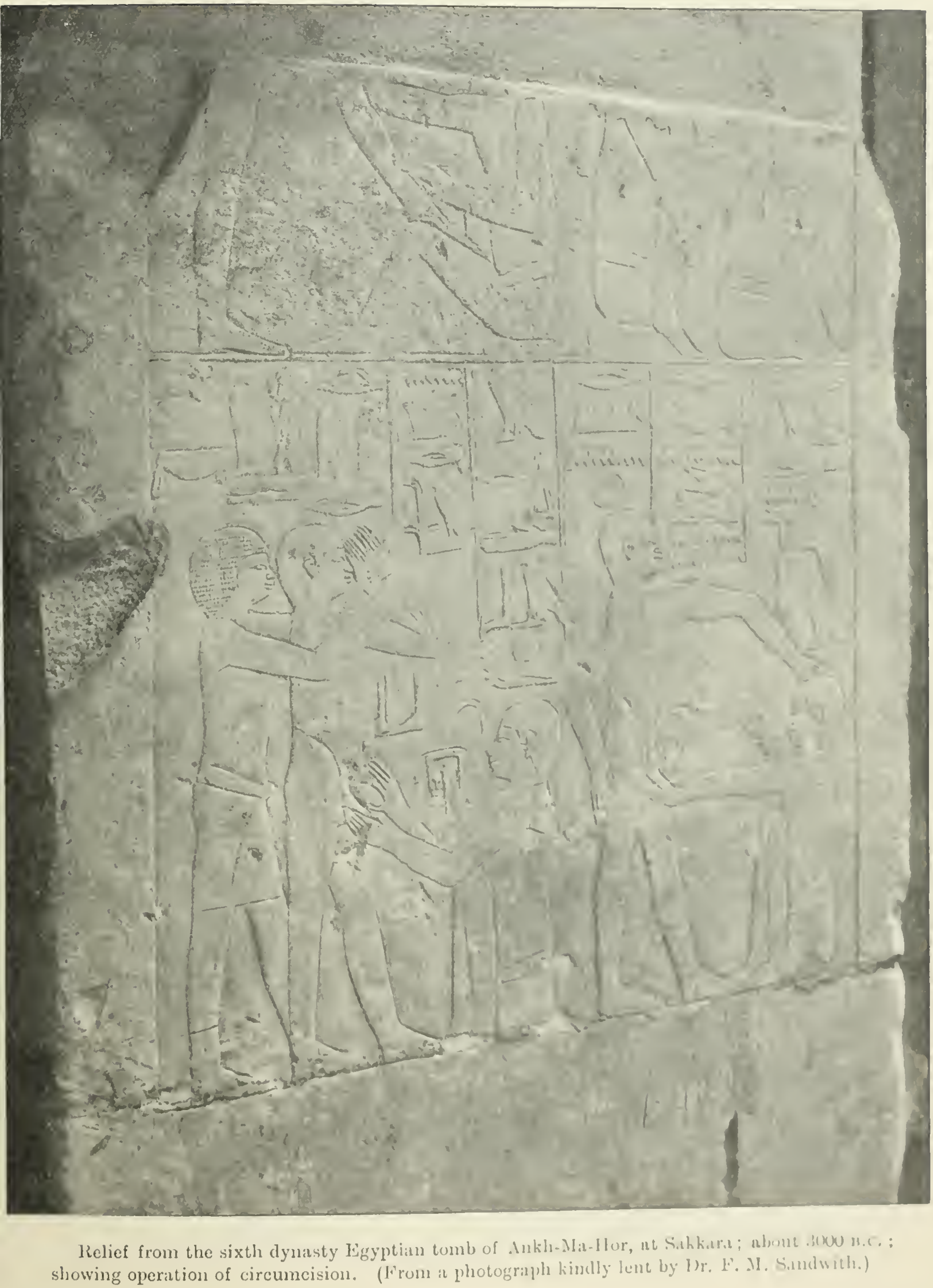
By JOSEPH OFFORD.

STUDENTS of medical matters in Roman times are familiar with the rescript of the Emperor Antoninus concerning the acts of circumcision and castration so prevalent at his period.[1] Much further light has now been thrown upon the administration of his law by a number of papyri recently discovered in Egypt. That country was a province where the edict was especially provocative, because not only its Jewish inhabitants but all the numerous priestly families who were worshippers of the ancient deities had practised the rite of circumcision from time immemorial.

The decision of Antoninus to restrict the practice as far as good statesmanship rendered possible, was not the first imperial effort of the kind, because Hadrian, at least, had endeavoured to stop all such mutilations. In his time, the luxury of having eunuchs, a system *de ménage* imported by Romans from the East, had become so frequent, that it threatened to diminish the population, and so he made the act of castration a capital crime. He also attempted to prohibit circumcision, because of the Jewish propaganda of the rite, to which his Hebrew subjects, after the dispersion under Titus, attached great importance, making it indispensable for converts, and imposing it upon their slaves. Many Romans were tempted to become Jews, owing to the numerous privileges that people still possessed, but what was Hadrian's chief

---

(*a*) Circumcidere Judaeis filios suos tantum rescripto Divi Pii permittitur, in non ejusdem religionis qui hoc fecerint castrantes poena irrogatur (Digest 48). (*b*) Cives Romani qui se Judaico ritu vel servos suos circumcidere patiuntur bonis ademptis in insulam perpetuo relegantur. Medici capite puniuntur Judaei, si alienae nationis comparatos servos circumciderint, aut deportantur, aut capite puniuntur (Pauli Sententiae, v, xxii).



Relief from the sixth dynasty Egyptian tomb of Ankh-Ma-Hor, at Sakkara; about 3000 B.C.; showing operation of circumcision. (From a photograph kindly lent by Dr. F. M. Sandwith.)

objection, except to its reducing the number of nominal Roman citizens, is not quite clear.[1] He held to his point, however, and Spartianus suggests it was the cause of the great Jewish rebellion of his reign.

Antoninus's rescript was more reasonable and practical politically. The Jewish religion being legally licensed, Jews were, by it, allowed to circumcise their offspring, but not their non-Hebrew slaves; such a deed was assimilated to castration, and the punishment was death for "humiliores": relegation for "honestiores." Romans might adopt the Jews' religion, but must neither circumcise themselves nor their slaves.[2] Confiscation of their wealth and banishment to an island were the penalties. Further, any medical man performing the operation was executed. This law of Antoninus has hitherto been thought to have been specially, if not entirely, anti-Jewish, but this was not so, and it is from this point of view that the evidence of the new papyri becomes so valuable.

The rescript applied to all peoples and countries in the Empire, but more particularly to Egypt, because of the frequency of circumcision therein. The number of papyri connected with this law already edited is a proof of this, there being three known at Geneva, one at Strasburg, two at Berlin, and two in the Tebtunis collection. These documents date from A.D. 155 to 189, showing that the rescript, the definite date of which is not known, was promulgated before 155, and remained in force at least until Commodus.

In ancient Egypt, circumcision was obligatory for the priesthood, but merely permissible for the laity. The Roman rescript prohibited it for the laity and for all but genuine Egyptian priests and Jews, the Emperor wisely not wishing to offend either the powerful priestly hierarchy or the influential Jewish community. But the operation was to be, as far as possible, restricted, and to achieve this the papyri prove that the permit was solely vested in the power of the official high priest, a sort of minister of worship who was not an Egyptian, but a Roman bureaucrat who, though residing at Alexandria, yet had authority over every Egyptian temple.

The manner of securing obedience to the rescript in Egypt is clearly disclosed by the papyri, showing that, instead of the decision of permit to circumcise being left to each temple for its hierophant's ruling, only the high priest could grant permission. Thus the whole matter was securely swept into the Roman executive net. To reduce the number of applications, a series of necessary formalities was devised, and these the papyri explain. First a written request, *βισλίδιον*, had to be forwarded to the (nome) county magistrate, or to the strategus, or their *locum tenens ad interim*. Thus a Tebtunis papyrus of A.D. 189 concerns a priestess, Isidora, wife of a priest, and preserves her appeal to the strategus of the Arsinoite nome, and omitting unimportant words runs thus :—

---

[1] "Codex Justiniarius," forbade the practice to Roman citizens who had become Jewish converts.

[2] Flavius Clemens, nephew of Titus and Domitian, who, with Domitilla, became Jews, suffered death, Gratz states, because he was circumcised. See *Gesch.*, iv, pp. 403-70.

"Wishing to circumcise my son Pakekbis, son of Cronion, and grandson of Harpocration, a priest exempt from tribute; intended to succeed to the office of prophet in the temple; and also Paneses, son of my deceased maternal uncle. I pray you, as usual, to write to the great high priest in order to obtain authorization to circumcise these two children and accomplish the appropriate holy ceremonies. This current year the children have: Pakekbis, seven years; Paneses, eleven years. My husband, the aforesaid Cronion, is absent at Alexandria, will bring them before his highness the high priest."

The request should have emitted from the children's father, but, if it were impossible, from another near member of the family. Isidora thus presented both, because her husband was away, and the other youth's father was deceased.

The main proofs presented to achieve permit were those of sacerdotal familyship. The most suitable documents for this purpose were the census returns, wherein were inscribed every person's name, affiliation, and status. Secondly, the attestation by a number of priests at the same shrine, or in the same county. They had their own temple archives setting forth the parentage and the name of one of the five temple tribes, of which the candidate had to be a member. The papyri prove that under Antoninus these statements as to status might be made verbally, but by the time of Commodus an inscribed and sworn testimony was necessary.

It is a curious fact that application to circumcise one of these lads, Panesis, appears to have been made one or two years earlier, and not granted, because the annexed text from the second Tebtunis papyrus contains the certificate of four temple dignitaries requesting to obtain the permit to circumcise the boy, and shows that at the date of this document his father Marepsemis was still living; it is given as a specimen of such records:—

"From Cronion, son of Pakekbis, son of Harpocration, deputy prophet, and from Maron, son of Cronion, son of Harpocration, and Maron, son of Maron, son of Marepsemis, and Pakekbis, son of Cronion, son of Psoiphis, the three last being priests, all four from the famous exempted temple of the village Tebtunis. With regard to the application presented to you by Marepsemis, son of Marsisuchus, son of Harpocration, priest of the said temple, requesting that his son Panesis by Thenpakekbis, daughter of Panesis, should be circumcised, in reply to your inquiry whether he is of a priestly family and ought to be circumcised, we declare on oath by the fortune of Marcus Aurelius Commodus Antoninus Augustus that he is in truth of priestly family, and that the proofs submitted by him are genuine, and that he ought to be circumcised, because he cannot perform the sacred offices unless this is done; otherwise may we be liable to the consequences of the oath."

The augmented legal formalities had for object to diminish the applications, for it was not necessary for all members of priestly families to be circumcised, but only those actually engaged in the cult of the gods. Many members were merely outdoor or inferior employees of temples, such as shepherds, gardeners, cultivators, builders, decorators, and mummifiers. It was only for ritual priests who personally approached the Deity that the Romans granted the rite. They could refuse it to the others without exciting religious fanaticism, and aptly did so.

The setting forth of the child's age in the papyri proves that there was a legal age limit, and they refer to such various ages as 1, 2, 5, 8, 7, and 11 years, indicating that for circumcising any age preceding puberty was permissible. Ambrose and Philo say the age for the operation was 13 and 14 years—evidently an error.[1] If the local inquiry was satisfactory, the strategus forwarded a summary of the proofs to the high priest. In papyri at Geneva and Strasburg we now possess such summaries.

Finally, the applicant had to present himself with the child at Alexandria, a great expense to residents in Upper Egypt. An indulgence on this point appears to have sometimes been granted, for a letter runs thus on the subject:—

"You are not ignorant of the anxiety I had in arranging the circumcision affair, but thanks to the valuable help of friends, we have managed it."

---

[1] They may have meant for Jewish youths only.

At Alexandria the high priest recited the report in favour, and then examined the boys to see if any of their bodies bore any blemish (σημεῖα), corporal perfection being most important. He could not decide in doubtful cases such a theological matter, and so if he saw minor marks, a jury of priests, or the ἱερογραμματεις, attached to his office examined the candidate.

A Geneva papyrus records a curious case: one boy had no σεμεῖα, but some cicatrices (οὐλάς); and there does not seem to have been a precedent for such a case in the sacred books. The papyrus passage preserving the decision is much mutilated, but the investigation seems to have been adjourned to see if the blemishes disappeared.

A satisfactory application was notified by the high priest to the local strategus in this wise:—

"Year 22 of our lord Aurelius Commodus Antoninus Cæsar; 21 of Thoth. Pacusis, a priest, has presented his son Horus of the Heracleid district of the Arsinoite nome requesting permission to circumcise him. Seeing he has deposited the proofs with the nome secretary and written a letter on the subject, Julianus has inquired of the hierogrammats if the child bears any marks. They replied 'No.' I, Julianus, high priest of temples, having countersigned the letter, have ordered the child to be circumcised according to custom."

A copy of such a permit as this was given to the party concerned, and a duplicate one deposited in archives of the high priest at Alexandria.

Doubtless the Egyptian officials and scribes devised numerous technicalities and legal difficulties in the composing and verifying of documents, upon finding that their Roman superiors desired to diminish the number of circumcisions, and for the purpose of obtaining baksheesh from those applicants who secured permission in consequence of all the literary formalities having been duly provided for perusal.

Old English Herbals, 1525-1640.

By H. M. Barlow.

The first herbal printed in England was a small quarto volume published anonymously by the London printer, Richard Banckes, in 1525. It is generally referred to as "Banckes' Herbal," and is the first of a series of small books, chiefly in black letter, without illustrations, which appeared during the next thirty years. This series may be distinguished from the larger and more important books with woodcut figures such as the "Grete Herball" and the herbals of Lyte and Gerard, which were based on works printed on the Continent. They came from the presses of various London printers, and were similar in size and external appearance. Some had titles closely resembling one another, and others carried the names of Macer and Askham, and the initials "W. C.," which have been supposed by bibliographers to represent the names Walter Cary and William Copland. Under all these names, therefore, these books may be found in various bibliographies such as Ames, Hazlitt, and others, and also in the printed catalogues of libraries and booksellers. Those having the appearance of anonymous works are generally grouped under the heading "Herbal."

It is somewhat strange that these quaint and interesting old volumes have not been bibliographically compared and described. In the history of the herbal they are thought to be of little or no importance, the attention of those interested in this fascinating literature being centred upon the series of larger works with woodcut illustrations. This is one reason why little consideration has been given to this series of books. Another reason is probably to be found in the obscurity concerning their authorship, the various writers to whom they have been ascribed, and whose names have already been quoted, having nothing whatever to do with the writing of them. It will be seen later that they are all various editions of the herbal printed by Banckes in 1525, but with trifling modifications, additions, or omissions. "Banckes' Herbal," on account of its numerous editions, enjoyed a popularity which was not shared by any other English herbal, even to a third of its degree. But this popularity depended, doubtless, on the price at which these editions were sold. Being small in size as well as in contents, and without illustrations, it would be very much cheaper than its rival folio work, profusely illustrated with woodcuts, the "Grete Herball," which passed through four editions, the first in 1526, and the last in 1561.

Moreover, "Banckes' Herbal" is extremely rare. I have consulted the catalogues of many important libraries, but of the majority of the various editions I have been unable to trace more than a single copy. On the other hand, the larger English herbals of Turner, Gerard, and Parkinson, are frequently to be found, not only in British libraries, but also in the catalogues of second-hand booksellers. Pulteney, in his "Sketches of the Progress of Botany in England," 1790, the standard work of its time, only mentions three issues, one bearing the initials "W. C.," printed by Copland, the second the name of Macer, and the third that of Askham, whom he describes as the author. And his remarks clearly indicate that two of these were not actually examined by him, but only had their titles quoted, probably from Ames. Again, in 1854, Meyer's important work, "Geschichte der Botanik," which is still the standard book on its subject, only mentions the editions quoted by Pulteney. Of that bearing Askham's name, Meyer writes: "Es scheint mehr Astrologie als Botanik zu enthalten," a statement which, together with another that "nur eine neue Auflage desselben ist wahrscheinlich," shows that he himself did not have access to the works. Ames is the chief authority to whom one would naturally turn for descriptions. In his "Typographical Antiquities" nine editions are recorded. In the present paper, particulars of no less than seventeen will be found, fourteen of which are actually in existence, and have been described directly from the books themselves. The descriptions of the other three are quoted from Ames.

The following titles and colophons are arranged in chronological order according to their printers, and approximate dates are assigned to a few of the undated copies. The first is that printed by Richard Banckes.

Title.—¶ Here begynnyth a new mater / the whiche sheweth and | treateth of y^{e} vertues & proprytes of her- | bes / the whiche is called | an Herball | ∴ | ¶ Cum gratia & priuilegio | a rege indulto. | [*Woodcut of plant with three conventional pieces or borders.*]

Colophon.—¶ Imprynted by me Rycharde Banckes / dwellynge in | Lōdō / a lytel fro y^{e} Stockes in y^{e} Pultry / y^{e} xxv. day of | Marche. The yere of our Lorde. M.CCCCC. & XXV. Black Letter, 4to, A—I in fours.

In the following year, 1526, Banckes issued another edition. The wording of both titles, with the exception of slight variations in the spelling, is found to be identical. Similar variations are noticed in the two colophons. As regards the text of the later edition, I am unable to say whether the same characteristics prevail, as I have not examined the copy personally, and am indebted to the kindness of Mr. H. G. Aldis, M.A., of the Cambridge University Library, where the work is to be found, for supplying the title and colophon.

Title.—❡ Here begynneth a newe marer / y^e whiche sheweth and | treateth of the vertues & propertes of her- | bes / the whiche is callyd | an Herball. | ∴ | ❡ Cum priuilegio. | [*Border pieces and other ornaments in lower part of page.*]

Colophon.—❡ Imprynted by me Rycharde Banckes / dwellynge in | Lōdō / a lytell fro y^e Stockes in y^e Pultry / ye. xxv. daye of June. The yere of our Lorde, M.CCCCC. & XXVI. Black letter, 4to, A—I^4.

The work contains 206 chapters, each containing an account of a herb, and arranged in the order of the alphabet. Concerning its authorship, nothing definite is known. According to the late Dr. Payne, it had "no connection with any herbal printed on the Continent, and was probably an abridgment of some mediæval English manuscript on herbs." Manuscripts of this kind were numerous in England during the fourteenth and fifteenth centuries, and some are still preserved in a few of the more important libraries. This subject will be referred to later in the remarks concerning Wyer's editions.

The next in order of date was probably that printed by Robert Redman.

Title.— : A boke of | the propertyes | of herbes the | whiche is | called an | Herbal | ✠ | [*Small woodcut.*]

Colophon.—Imprynted at | London in Fletestrete at | the sygne of the George by | me Robert Red- | man ∴ | ✠ | [*Printer's mark.*] Black letter, 8vo, A—I^8, K^4.

The approximate date assigned in the British Museum catalogue is 1530. This cannot be far wrong. It could not have been printed earlier than 1530, and might possibly be attributed to 1531—32. "Fletestrete at the sygne of the George" was the address until his death of Richard Pynson (Redman's rival printer), who died between November 18, 1529, and February 18, 1530, the dates of the making and the proving of his will. Redman succeeded Pynson at the above address, and was established there in 1530, as he began to use Pynson's device in that year. On account of the popular nature of the herbal, we might expect it to be one of the first works to which Redman would turn his attention, although he was printing from 1525 to 1530 at another address, and does not seem to have issued an earlier edition. This edition of the work, therefore, could not have been printed before 1530, and must be assigned to a date between 1530 and 1540, the latter being the year of his death.

I am unable to trace an edition printed by John Skot. In the list of this printer's books, compiled by Mr. Gordon Duff, I find the following entry: "The Book of Herbes, 12mo. undated." This, of course, is not the exact wording of the title. The compiler did not gain access to a copy, as none of the catalogues of the chief British libraries records one, and it is doubtful whether a copy is now in existence. I quote the following notice from Herbert's edition of Ames, 1785:—

"'A boke of the propertyes of herbes the which is called an Herbal.' Contains K^{4}. 'At the end, Imprynted at London by me John Skot dwellynge in Fauster Lane.' This over his device which is his cypher on a shield, hung on a rose-tree, flowering above the shield, supported by two griffins; at the bottom is a dog nearly couchant; I.S. the initials of his name, one on each side of the trunk of the tree. In the collection of Mr. Alchorne. Twelves."

Details of Skot's life are scanty, but his earliest address was "in the Parish of St. Sepulchre outside Newgate," where he issued his first dated book in 1521, his device at this time consisting of "his mark and initials on a shield surmounted by a helmet and supported by two dragons." By 1528, he was established in St. Paul's churchyard, where he used a new device as well as a modification of the old one. His last dated book, 1537, and five undated ones were printed in "Fauster Lane in St. Leonard's Parish." His edition of the herbal was printed at this last address, and must therefore be ascribed to the latter part of his career. It was probably printed between the year 1532 and the date of his disappearance in 1537.

The next three editions were printed by Robert Wyer. They are all without dates, but as far as I am able to ascertain, the following is their order:—

Title.—¶ A newe Her- | ball of Macer, | Translated | out of La- | ten in to | Englysshe.

Colophon.—¶ Imprynted by | me Robert wyer, | dwellynge in saint Martyns pa | ryshe, at the sygne of saynt | Johñ Euangelyst, | besyde Charyn | ge Crosse. | ✠. Secretary type, 8vo, A—P.^{4}

Title.—¶ Hereafter folo | weth the know- | ledge, proper | ties, and the | vertues of | Herbes.

Colophon.—¶ Imprynted by | me Robert wyer, | dwellynge in saynt Martyns pa- | rysshe, at the sygne of saynt | John Euangelyst, | besyde Charyn | ge Crosse. | ✠ | [*Printer's mark*] Secretary type 8vo, A—P.[4]

Title. — Macers | Herbal | Practy- | syd by | Doctor | Lynacro | Translated out of laten, | into Englysshe, which | shewynge theyr Ope- | racyons & Vertues, | set in the margent | of this Boke, to | the extent you | myght knowe | theyr Ver- | tues.

Colophon.—Imprynted by | me Robert wyer | dwellynge in seynt Martyns Pa- | rysshe at the sygne of seynt | John Euangelyst, besyde Charyn- | ge Crosse. [*Printer's device*]. Black letter, 8vo, A—W.[4]

The dates assigned to these works in the British Museum Catalogue are 1535, 1540, and 1530 respectively. Now a characteristic of Wyer's books is that not more than eight or nine, out of a series of more than one hundred, show the year of printing. It is, therefore, a difficult and dangerous task for one who is not a practical printer or typefounder to assign any date from a comparison of the types alone. Mr. Henry R. Plomer made a study of Wyer's books, and came to the conclusion that the "Secretary" type—so-called from its resemblance to the manuscript writing of the period—was used for the text of all books printed down to 1542. But in 1542, and from that time onwards, the order was reversed, the text of all books being printed in Black Letter, and the supplementary matter in "Secretary." Of the three editions quoted above the first and second are in this "Secretary" type, and as the approximate dates ascribed to these—namely, 1535 and 1540—fall in the period during which this type was employed, and as, also, there is no evidence to show that they were not printed during that period, they may be allowed to stand. But according to Mr. Plomer's theory, the third edition, the text of which is in black letter, must be assigned, not to the year 1530, but to a date later than 1542. Apart from the question of types, Mr. Plomer was of the opinion that this edition was later than the one ascribed to 1535, on account of "an addition to the text of herbs under (A)." But this consists only of two single lines obscurely placed at the end of A, immediately preceding B. They are of no importance, and seem to me to prove nothing. The order of the editions might just as well have been reversed and the lines omitted.

Some interesting observations may be made with regard to two of these editions printed by Wyer. It will be observed that the title-pages represent the work to be a translation of the Latin poem of

Macer on the virtues of herbs, and is so styled by Pulteney, who calls it a "jejune performance written wholly on Galenic principles." Other writers have followed Pulteney, but they do not seem to have examined these books, and their only authority is Wyer's new title-page. The herbal is supposed to have no connexion with the work of Macer, and that Wyer simply published it under that name to give it a high-sounding and attractive title, and thus enhance the chances of sale. I am not inclined either to support or question this supposition. My original intention was to ascertain to what degree, if any, Wyer was justified in affixing Macer's name to the work, but as the materials are only accessible in the British Museum, and official duties only permit of occasional visits to that library, I have been unable to carry out my desire. The original poem of Macer consisted of an account of the virtues of seventy-seven herbs. As Wyer's edition contains accounts of almost double that number, it will be seen that it is not a translation of the original poem, but as Macer's work was the most popular herbal of the Middle Ages, various manuscripts came into existence, modified and augmented to such an extent that, although they appear with the name of Macer, they are in reality different works. These manuscript herbals, purporting to be copies and translations of that writer, are probably the most common of all the manuscripts treating of the virtues of herbs. In the British Museum there are several belonging to the fourteenth and fifteenth centuries bearing this name, which show that the work was popular in England at that period. Bishop Tanner, quoted by Pulteney, refers to a fourteenth-century translation by one, John Lelamour. This found its way into the library of Sir Hans Sloane, and is now in the British Museum, together with other manuscripts on herbs belonging to the same collection. Lelamour's version I once hastily examined, and compared it with the printed editions of our herbal by Wyer. From the notes I made at the time, I found that it consisted of a number of chapters about equal to, or slightly in excess of, the number in Wyer. Of those I compared the majority seemed to have no connexion with the corresponding chapters in the printed herbal, but a few here and there agreed almost word for word. Wyer's employment of the name Macer, as far as Lelamour's manuscript is concerned, seems therefore to some extent justified, but his printed edition cannot be called a direct translation of the original seventy-seven chapters in verse which appeared with the name of Macer.

The above remarks concerning the agreement of a few chapters in Wyer's herbal with the corresponding chapters in Lelamour's manuscript apply also to Banckes' herbal, for the text of Wyer's book must be regarded as another edition of Banckes'. There are, however, a few differences. The chapters in Wyer's three editions number 183 against 206 in Banckes', and some contain slight additions to the text. At the end of the books there are three additional chapters which are not found in Banckes': (1) The vertue of the oken tre; (2) The makynge of aqua vite perfectissima; (3) Graffynge & plantynge.

The statement that Wyer had no justification for the use of Macer's name on his title-page is more applicable to Linacre. Pulteney, in his reference to Macer's herbal, was led into making the remark that "even Linacre did not disdain to employ himself on this work." Such, however, was not the case. Linacre died five or six years before Wyer began to print, and there is no doubt that the honoured name was surreptitiously used to lend undue authority to the work. Whether or not Wyer was censured for this nefarious procedure I cannot say, but Linacre's name never appeared in later editions, although the same printer issued another book with the title, "Tho. Linacre, Doctor of Phisick, his compendious regiment, or dietarie of health used at Mount Pillour" (i.e., Montpelier). It is doubtful whether a copy of this exists. Maunsell records it in his catalogue of 1595. Needless to say, Linacre wrote no such work.

The next two editions of the herbal were printed by Thomas Petyt in 1541, and by William Middleton in 1546. Both are dated, and, like Banckes' edition, the text begins with "Agnus Castus" and ends with "Wormwood." The only copies I have been able to trace are in the Bodleian Library, and to Mr. Falconer Madan, M.A., I am indebted for copies of the title-pages and colophons.

Title.—A boke of | the propertyes | of herbes the whiche | is called an Har | bal, M.D. | XLI. |

Colophon.—¶ Imprynted at London | in Paules churchyearde, | at the Sygne of the may- | dens head by Tho- | mas Petyt. | M.D.XLI. | Black letter, 8vo, A—I,^{8} K.^{4}

Title.—A boke of | the propertyes | of herbes the | whiche is | called an | Herbal.

Colophon.—Imprinted | at London in Fletstrete | at the sygne of the George | nexte to seynt Dunstones churche | by me Wyllyam Myddylton | In the yere of our Lorde | M.CCCCC.XLVI. | The thyrde day of July | Black letter, 8vo, A—I,^{8} K.^{4}

The following edition was printed by John Waley (or Walley):—

Title.—¶ A boke of | the propertes | of herbes the | which is cal | led an her | bal. | ✠ | [*Woodcuts representing Job and Amos at the bottom.*]

Colophon.—Imprynted at | London by | Johan Waley, | dwellynge in | Foster Lane. | [*Woodcut of St. John the Baptist*] Black letter, 8vo, A-H^8, K^4.

The only copy I have been able to find is in the library of the Manchester Medical Society, and I am indebted to the Librarian, Mr. A. F. C. Davey, for the above title and colophon. This edition is also undated, but in the old catalogue of the library the year is given as 1548. On what authority this has been fixed I cannot say, but from a comparison with other editions of the work, and in the absence of further details concerning the life of the printer, this date, I think, must be allowed to remain. As John Waley did not begin to print till 1546, the book could not have been published before that date. As in the case of other printers, Waley would probably make this popular work one of his earliest productions. This conjecture is also supported by the address in the colophon, "Foster Lane," where he was first established. Now to limit the probable period of the printing we must observe that two editions of the herbal printed by Wm. Copland, assigned to the years 1550 and 1552, have title-pages which show a considerable and well-marked deviation in the general wording. With the exception of Wyer's edition, previous issues have borne a short and simple title such as that of the present edition by Waley. Copland's title, then, seems to mark a new era in the career of the herbal, and may be regarded as the first of a series of descriptive and much longer titles, in which all later editions, with one exception, may be included. Those prior to Copland's may therefore be classed as a series of particular titles, the last of which was probably Waley's. Moreover, Copland's editions contain for the first time three additional chapters on "The virtues of water's stylled," "The tyme of gathering of sedes, etc.," and "A generall rule, etc.," which, I believe, are to be found in all later editions. If Waley's had been printed later than Copland's, it is reasonable to suppose that he would have followed the practice of all the later printers by including these additions, as any indication that the work contained extra matter would have enhanced the chances of sale. But Waley closely follows the earlier editions of Banckes, Petyt and Middleton, and I should therefore judge his work to have been printed prior to that of Copland. If, therefore, the year assigned to Copland's earliest issue be correct—namely, 1550—Waley's must have been printed between 1546 and 1550. On this supposition the date 1548 may be allowed to stand.

The most interesting of all the editions of this little herbal are those printed by William Copland. As already stated in the remarks concerning the last printer, the title-pages of Copland's issues mark a new era in the career of the work. On account of the new wording of the title and the appearance of the initials "W. C.," two important errors have arisen concerning the authorship of the work. These will be referred to later.

Title.—A boke of the | propreties of Herbes called an her- | ball, whereunto is added the tyme y^{e} | herbes, floures and Sedes shoulde | be gathered to be kept the whole ye- | re, with the vertue of y^{e} Herbes whē | they are stylled. Also a generall rule | of al manner of Herbes drawen out | of an auncient boke | of Physycke by | W. C. | [*Woodcut of three roses in triangular position within a double circle; upper rose crowned; riband, "Kȳge of floures."*]

Colophon.—Imprinted at London by Wyllyam | Copland. | Black letter, 8vo, ¶ ✱^{4}, A—I^{8}, K^{4}.

Title.—A boke of the | propreties of Herbes called an her | ball, whereunto is added the time y^{e} | herbes, floures and Sedes shold | be gathered to be kept the whole | yere, wyth the vertue of y^{e} Her- | bes when they are stilled. Al- | so a generall rule of all ma- | ner of Herbes drawen | out of an auncyent | booke of Phisyck | by W. C. | [*Woodcut of garden with lady seated; man approaching, and another holding her from behind. Wall in background, over which are men apparently in consultation.*]

Colophon.—¶ Imprynted at London in the | Flete strete at the sygne of | the Rose Garland by | me Wyllyam Copland. | for John wyght. | Black letter, 8vo, A—K^{8}.

Both are undated. In the British Museum Catalogue, the former is assigned to the year 1550, and the latter to 1552. Like Banckes's edition, the text of each begins with "Agnus Castus" and ends with "Wormewood." Although the corresponding chapters agree word for word throughout, they are two distinct and different issues. But in addition to the text of Banckes's, these editions by Copland contain for the first time the three extra chapters already quoted: (1) "The vertues of waters stylled"; (2) "The tyme of gathering Sedes, floures, herbes, and Rootes . . ." (3) "A generall rule of all maner of herbes . . ."

In the former edition the second and third of these additions precede the first chapter of the text, "Agnus Castus," while the first falls between the end of the text "Wormewood" and the "Table." In the latter edition their position is changed. The first and second take the place of the second and third, while the third follows the "Table."

The interesting point concerning Copland's issues is that the initials "W. C." on the title-page have given rise to two curious errors regarding the authorship of the works. By present-day cataloguers and bibliographers these initials have been taken as representing the names "Walter Cary" and "William Copland," and under one or the other of these many editions are frequently found. In the British Museum Catalogue, Walter Cary is credited with the authorship, and Copland is stated by his biographer in the "Dictionary of National Biography" to be the compiler. Bishop Tanner also refers to Copland as the editor. With regard to Walter Cary, I should say that Ames (or Herbert) was probably the first to ascribe it to that author. In the monumental work, "Typographical Antiquities," various editions are catalogued. In the entry describing one published by Anthony Kitson we find the name "*Walter Cary*" added in italics after the initials "W. C." This is evidently the authority on which later bibliographers have ascribed the work to Cary. But it is clear that Ames (or Herbert) had no positive knowledge concerning either the work itself or the supposed author, for in his description of another edition printed by Copland he adds, after the same initials "W. C.," the words "probably himself," which means, of course, that William Copland was probably the author. Had the contents and the origin of the work really been known to him, he would not have ascribed two separate editions to two different authors.

This error suggests the question, "Who was Walter Cary?" I know of no medical writer of this period other than this author whose name could be represented by the initials "W. C." But details concerning the life of Cary are not easily found. The standard biographical works such as Tanner, Cooper, Wood, Munk, and the "Dictionary of National Biography" contain no reference to him, and no mention of his name is to be found in the indexes to the Sloane, Harleian, Stowe, and additional MSS. Even a request for information in *Notes and Queries* brought forth no reply.[1] Cary was however, the author of the works, "Carie's farewell to Physicke," 1583, "The Hammer for the Stone," 1581, and, according to the British Museum Catalogue, "The Present State of England," &c., 1626. Now, if Cary wrote as late as 1626, it is obvious that he could not be the author of the herbal printed in 1550, which was another edition of the work printed by Banckes in 1525. But owing to the fact that the "Present State of England" was not a medical book, and that, also, an interval of forty-five years separated the work from "The Hammer for the Stone," 1581, I am not perfectly satisfied that Cary was publishing as late as 1626. Moreover, we are confronted with the tantalizing information by Hazlitt that editions of the "Hammer for the Stone" were printed by R. Kele (without date), W. Myddylton, 1546, and T. Petyt, 1543, which, if correct, makes Cary a contemporary of Copland and kills the argument that he could not have been the author of the herbal on account of his having lived at a period much too late. But I am equally apprehensive that no such editions existed, as Hazlitt's information does not consist of bibliographical descriptions, but only references to these editions, which proves that he never saw them. The edition of 1546 is also entered under Myddylton's books in Duff's "Hand Lists," but the book itself was not examined by the compiler, as the absence of the name of any library after the entry of the work indicates that no copy is to be found either in the British Museum, the Bodleian, Cambridge University, or in other libraries, the catalogues of which are accessible. The entry was probably quoted from Hazlitt. Moreover, the probability that these editions never existed is increased by evidence that Cary was living as late as 1611. In an edition of his "Farewell to Physicke" published in that year one finds "A caveat (from the

---

[1] At the moment of going to press there appears in *Notes and Queries* (March 29, 1913) a lengthy and important account of the Cary family by Mr. A. L. Humphreys, who refers to an entry which escaped my notice in W. D. Macray's "Register of Magdalen": "Walter Carie or Carey, co. Bucks, elected for dioc. Chichester, Demy, 1561 (Reg. p. 160). M.A. lic. March 24, 157½, inc. July 14. On Feb. 8, 1573, he had six months' leave 'causa promotionis.' Resigned 1574."—New Series (London, 1897), vol. ii, p. 184. Mr. Humphreys also draws attention to a passage in "The Hammer for the Stone," 1580, which indicates that the author lived at High Wycombe. This passage I noticed when I examined the work, but did

---

not quote as it threw no light on Cary's supposed association with the herbal. The following passages are taken, apropos of my own remarks, from Mr. Humphreys's valuable account of the Cary family, which is the result of a search among the records of the ancient town of High Wycombe: "'A Boke of the Propreties of Herbes' . . . bears on the title-page the initials 'W. C.,' which may stand either for Copland or Cary. This was one of several editions of Banckes's 'Herbal,' then very popular, and, although it may have been edited or promoted in some way by a Walter Cary, it could not have been by the one who wrote 'The Hammer for the Stone.' The 'Herball' was issued somewhere about 1550, and various editions of it exist, . . . but all these appeared when the Walter Cary we are considering was a child. There is, however, a connexion between the Carys and herbals, because it is well known that Henry Lyte (1529-1607) of Lytes Cary was the famous translator of Dodoen's 'Herball,' 1578, and he had a herbal garden at Lytes Cary. . . . It seems certain that 'The Hammer for the Stone' and 'The Farewell to Physick' were written by Walter Cary of High Wycombe, M.A. of Magdalen; but, from the dates, it is impossible that the same Walter Cary could have written the Herbal, and most improbable that he wrote 'The Present State of England.'"

Authour) to the Reader," signed "W. Carie," complaining that "W. White hath printed this book without my consent," and therein "abused me the author." From this it is evident that Cary was alive in 1611, and was not then too old to be interested in literary work. This proves beyond a doubt that Cary could not have been the author of our herbal, for the edition bearing the initials "W. C.," printed about 1550, was another edition of "Banckes' Herbal" of 1525. Assuming, then, that the author or compiler was at least aged 25 when the work was first published, the date of his birth would be 1500. He would not therefore be writing "caveats" in the year 1611.

Having disposed of Walter Cary, we must now consider William Copland, whose association with the work was that of printer. Three or four editions are attributed to his press, and the only authority, so far as I am aware, for the statement that he compiled the work was the conjecture of Ames (or Herbert), already quoted. When the two books were examined, the connexion between Copland's edition and those by earlier printers was evidently unnoticed, and the new, elaborate title with the initials "W. C." gave the book the appearance of an entirely new work. It was only necessary for Ames to have had an earlier edition in his hands, when he described the one printed by Copland, to see that the texts were identical almost word for word. Copland's issue, with the exception of the three additional chapters, was another edition of "Banckes' Herbal." But, as these additions were printed for the first time by Copland, it is quite possible that they were "drawen out of an auncyent booke of Phisyck" by Copland himself. If the title is examined once more, it will be seen that this theory is quite tenable.

Two other editions, published by Anthony Kitson and Richard Kele, must, I think, be ascribed to Copland's press. Of these I have not been able to locate any existing copies, and therefore can only quote their titles from Ames. The following is Kitson's edition :—

"A booke of the properties of Herbes, called an Herball. Whereunto is added the tyme that Herbes Floures and Seedes should bee gathered to bee kept the whole yeare, wyth the vertue of the Herbes when they are stylled. Also a generall rule of all maner of Herbs, drawen out of an auncient booke of Physicke by W. C., *Walter Cary*. Contains besides X^4 in eights, For him."

It will be observed that the wording of this title, with the exception of variations in the spelling, is the same as those by Copland just described. This also is undated. Ames gives no colophon, and it is therefore difficult to fix the year of printing and to ascertain from whose press it was issued. Kitson published very few books, and these were printed for him by others. As Copland printed editions of this herbal for John Wight and Richard Kele, I should say that he printed Kitson's edition also. The new title, which was Copland's innovation, supports this conjecture. The signatures "X^4 in eights" attract the bibliographer's attention. I should imagine this to be a misprint for "K^4 in eights." To have contained X in eights, the book would have been extended to twice its original length, and from my acquaintance with previous editions I cannot conceive that the present issue underwent such a considerable augmentation. The following, published by Richard Kele, is said to have been taken by Herbert from an imperfect copy:—

"The book of the properties of herbes, called an herball, etc., drawn out of an ancient book of phisyck by W. C. (probably himself) and with it a book of the seeing of vrynes of all the colours that vrynes, and with the medyeynes annexed to euery vryne, and euery vryne hys urynall. For R. Kele, 12 August."

The size is octavo, and the date assigned in Ames is 1552, but in Duff's "Hand Lists" it is given as 1550. In any case it could not have been later than 1552, for in that year Kele died. The majority of his books were printed for him by W. Copland, W. Seres, or R. Wyer.

Another writer, who has been described as the author of two editions of the herbal, is Anthony Askham or Ascham, a priest, astrologer, and physician, who graduated M.B. in 1540, and was presented by Edward VI, in 1553, to the living of Burneston, in Yorkshire. In 1550 there appeared:—

Title.—A lytel | herball of the | properties of her- | bes newely amended and corrected, | with certayne addicions at the ende | of the boke, declaryng what herbes | hath influence of certaine Sterres | and constellations, wherby may be | chosen the beast and most luckye | tymes and dayes of their mini- | stracion, accordynge to the | Moone being in the sig- | nes of heauen, the | which is dayly | appoynted | in the | Almanacke, made and gathered | in the yere of our Lorde god | M.D.L. the xii day of Fe- | bruary by Anthonye | Askham Phi- | sycyon.

Colophon.—Imprynted at | London in Flete- | strete at the signe of the George | nexte to Saynte Dunstones | Churche by Wylly— | am

Powell. | In the yeare of oure Lorde | M.D.L. the twelfe day of Marche. Black letter, 8vo, A—K^7. (A perfect copy A—K^8.)

This book, together with a later edition printed by John King, is always attributed to Askham, and is placed under his name in bibliographies and catalogues. It has become known as "Askham's Herbal," and he is even credited with the authorship by his biographer in the "Dictionary of National Biography." I have examined the work, and have no hesitation in describing it as another edition of "Banckes' Herbal," 1525. There are, however, fewer chapters, these numbering 185 against 206 in Banckes, but copied practically word for word from the corresponding chapters in the 1525 edition. Under the letter A there is a slight rearrangement into stricter alphabetical order.

It is difficult to assign any part of this book to Askham. One searches in vain, not only for any indications of original additions by this writer, but also for any justification, however slight, for the association of his name with the work. The "certayne addicions at the ende of the boke" are not to be found, and I do not suppose they were ever printed. The text, like that of Banckes', ends with "Wormwode," and is followed by the "Table." For the omission of these additions I am unable to assign any reason. With the exception of the last leaf, which is blank, and is wanting in the copy I examined, the book is complete, and must have been published without them. This curious fact is all the more difficult to understand when we find that Powell printed nearly all the works attributed to Askham. If the bibliographers who have ascribed the work to this author had examined the title with greater care they would have observed that the phrase "by Anthonye Askham" refers not to the substance of the book itself, but to the "Almanacke," from which the additions were intended to be taken.

As all Askham's pieces are exceptionally scarce it is rather a pity that these additions, consisting evidently of a curious mixture of herbal medicine and astrology, were not included. It would have been interesting to learn what was the teaching of this astrologer, priest, and physician, whose liberal education, thought Pulteney, should have secured him from such delusion. One of his works, published in the same year as the herbal, and by the same printer, treats of astrological botany, but, like the Almanack, it is so scarce that I have not been able to trace a copy. It is known by the title: "Anthony Ascham his Treatise of Astronomie, declaring what herbes and all kinds of medicines are appropriate, and under the influence of the Planets, Signs, and Constellations: also how ye shall bring the virtue of the heavens, and nature of the starres to every part of man's body being diseased to the sooner recouerie."

Another edition bearing Askham's name was printed by John Kynge. It is copied from that printed by Powell, and has the same title, with the usual variations in the spelling :—

Title.—A litle Her- | ball of the properties of Herbes, | newly amended and corrected, wyth | certayne Additions at the ende of | the boke, declaring what Herbes | hath influence of certain Sterres | and constellations, whereby maye | be chosen the best and most lucky | tymes and dayes of their mini- | stracion, according to the Moone | beyng in the signes of heauē | the which is daily appoī- | ted in the Almanacke, | made and gathe- | red in the yeare | of our Lorde | God. | M.D.L. | the xii. daye of Febru- | ary by Anthony Askhã | Physycyon. |

Colophon.—Imprynted at London, in | Paule's churchyarde, at the | signe of the Swanne, by | Jhon Kynge. | Black letter, 8vo, A—K^7. (A perfect copy A—K^8.)

The colophon bears no date, and the year 1550 mentioned on the title-page, which relates to the "Almanacke," and not to the book itself, has been quoted by bibliographers as the date of publication. This is the date assigned to the work in the British Museum catalogue. King, however, did not begin to print until 1555, and the book, therefore, could not have been printed before that year. A more probable date would be 1556—7.

The last edition of "Banckes' Herbal" we have to consider was also printed by John Kynge, who this time followed the title given to the book by Copland, rather than that by Powell, which he copied in the edition just described.

Title.—❡, A boke of the | propreties of Herbes called an her | ball, whereunto is added the time y^e | herbes, floures and Sedes shold | be gathered to be kept the whole | yere, with the vertue of y^e Her | bes when they are stilled. Al- | so a general rule of al ma- | ner of Herbes drawen | out of an auncient | boke of Phisyck | by W. C. | [*Woodcut.*]

Colophon.—❡, Imprinted at London by | Jhon kynge, for | Abraham Wely. | Black letter, 8vo, A—K^8.

This contains the same number of chapters as Banckes' edition, as well as the additions found for the first time in Copland's. It is also undated, and I am unable to say whether it was earlier or later than the other edition by the same printer. Details concerning Wely's life afford no clue, but it must have been printed between 1555, the year when King began to print, and 1561, the date of his death.

In concluding these notes on the various editions of the first herbal printed in England, it is perhaps necessary to explain why they have been made the subject of such a considerable portion of this paper. The explanation must be that this, I believe, is not only the first occasion on which they have been collectively described, but also the first attempt to remove the obscurity that has long existed concerning their authorship, so far at least as it concerns the printer, Wm. Copland, and the writers, Walter Cary, Anthony Ascham, and Thomas Linacre. With regard to the origin of the herbal, I think it will probably be found in one or more of the numerous fourteenth or fifteenth-century manuscripts on the virtues and properties of herbs which are still preserved in various libraries of this country. The issue may not be important, but here is a field of interesting research for the leisured student of this fascinating old literature.

"THE GRETE HERBALL."

A year after the publication of "Banckes' Herbal," 1525, there appeared the first of the larger series of profusely illustrated books which were based chiefly on works printed on the Continent.

Title.—The grete herball | whiche geueth parfyt knowlege and under- | standyng of all maner of herbes & there gracyous vertues whiche god hath | ordeyned for our prosperous welfare and helth, for they hele & cure all maner | of dyseases and sekenesses that fall or mysfortune to all maner of creatoures | of god created, practysed by many expert and wyse maysters, as Auicenna and | other &c. Also it geueth full parfyte understandynge of the booke lately pryn | ted by me (Peter treueris) named the noble experiens of the vertuous hand | warke of surgery. [*Woodcut of a man, with a spade in his right hand, gathering grapes, and a woman emptying herbs and flowers out of her apron into a basket. In the lower corners two figures representing a male and female mandrake.*]

Colophon, preceded by full-page woodcut of printer's mark.—¶ Imprentyd at London in South- | warke by me peter Treueris, dwel- | lynge in the sygne of the wodows. | In the yere of our Lorde god. M.D. | XXVI. the xxvii. day of July. Black Letter, folio, ✠^{6}. A—Z^6, Aa—Ee^6.

According to Ames, the first edition of this work appeared in 1516, but no trace of any copy bearing this date can be found. It is doubtless an error, as Treveris did not begin to print until 1522.

The second edition was also printed by Treveris in 1529. It is a copy of the first, without additional matter. The wording of the title is the same, but it will be observed that the last three lines do not contain the same number of letters. This fact, together with variations in spelling, shows that the type was set up afresh, and is, therefore, a new edition, not a re-issue of the original sheets with a new title-page. The colophon differs from the first in that it does not contain the printer's address.

¶ Imprynted at London in South | warke by me Peter Treneris. In | the yere of our Lorde god. M.D.XXIX. | the xvii day of Marce. Black letter, fol., ✠^{6}, A—Z^6, Aa—Ee^6.

The colophons of both editions are preceded, on the same page, by the printer's mark, the top and bottom parts of the border of which are different. In addition to the 505 chapters on the virtues and properties of herbs, trees, and some minerals, arranged in the order of the alphabet, both editions contain an "exposicyon of wordes obscure" and a treatise on urines: *Sig. Cc. iiii, recto., bottom of col. 2.*—Hereafter foloweth the knowlege of ye dyuersytees and colours of all maner of urynes. . . . With regard to the authorship, it is necessary to quote the latter portion of the preface, but as this part of the book illustrates the medical ideas which prevail throughout these herbals, more especially the earlier ones, it is thought desirable to quote it in full. In reading of the virtues and healing properties we constantly come across such sentences as these:—

> This herb is hot and dry
> This herb is cold and moist, etc., etc.

These at once suggest the well-known theory adopted by Hippocrates regarding the four elements—Fire, Water, Earth, and Air. Upon this theory Galen based the hypothesis which ascribes to the properties of medicines and herbs the four qualities (or "principles" or "natures"), Heat, Cold, Dryness, and Moisture. In the four elements the four qualities were combined in pairs, thus:—

> Fire was hot and dry.
> Air was hot and moist.
> Earth was cold and dry.
> Water was cold and moist.

By the maintenance of an equable proportion and intermixture of these qualities the body of man was healthy and free from sickness. Disease was the result of their inequalities. The aim of the physician, therefore, was to promote qualities the opposite of those associated with the existing disease, and from this standpoint the virtues of herbs were studied, and their heating or cooling properties determined. Each quality existed in four degrees. We thus find that a herb is hot or cold, moist or dry, &c., in the first, second, third, or fourth gradation.

The introduction to the "Grete Herball" is as follows: "Consideringe the greate goodnesse of almightye God, creatour of heauen and earthe, and all thinge therein comprehended, too whome be eternall laude and prayse, etc. Considering the course and nature of the foure elementes, and qualities, where to the nature of a man is inclined, out of the which elementes yssueth diuers qualities, infirmities and diseases in the corporate body of man, but God of his goodnes, that is creatour of all thinges hath ordeyned too hys owne likenesse, for the great and tender loue, which he hath unto hym, to whom all thinges earthely he hath ordeined to be obeysant for the sustentacion and health of hys louyng creature mankynde, whiche is onely made egally of the foure elementes and qualities of the same, and whan any of these foure habounde, or hath more dominacion the one than the other, than it constrayneth ye body of man to great infyrmities or diseases, for the whiche the eternall God hath geuen of his haboundante grace, vertues in all maner of herbes, to cure and heale al maner of sekenesses or infirmities, to hym be falling through the influent course of the foure elementes beforesayde, and of the corrupcions and the venymous ayres, contrary the health of man. Also of unwolsame meates or drynkes, or holsame meats or drynkes, taken untemperatly, which be called surfetes, that bringeth a man sone to great diseases or sekenesse, whiche diseases ben of numbre and unpossible to be rehersed & fortune as wel in vilages, where as nother Surgeons nor Physicians be dwellynge nygh by many a myle, as it doth in good townes where they be readye at hande. Wherefore brotherly loue compelleth me to wryte throughe the gyftes of the holy Ghoste, shewynge and enformyng how man maye be holpen with grene herbes of the garden and wedes of the feldes, as wel by costly receptes of the potecarys prepayred. Also it is to be understande, that all maner of medecynes that be contrary to sekenesses, is for the great superfluyte of ye humours or the diminucion of them, or for to restrayn the ours, where it is agaynst the feblenesse of ye vertues, for the alteration or solucion of contynuetes or woundes or other begynnynges, etc. It also to be understande that we fynde medecyns symple, laxatyfe, appetisant and mynysshinge the superhabundance of humours, and also symple medecynes curās, and also medecynes alteratyfes and consolidatyfes," &c.

The following is the remaining part of the introduction relating to the authorship: "This noble workes is compyled, composed, and auctorysed by dyuers & many noble doctoures and experte maysters in medecines, as Auicenna, Pandecta, Constantinus, Wilhelmus, Platearius, Rabbi moyses, Johannes mesue, Haly, Albertus, Bartholomeus, and more other," &c.

But this is not a sufficient explanation of its origin. The text was not compiled by any English writer directly from the authors quoted. With the exception of the preface and the supplement, it is a translation of the popular French work, "Le Grant Herbier," the source of which has been the subject of some speculation. It has been regarded by Choulant as derived from the Latin "Ortus Sanitatis," and by others from the German "Herbarius zu Teutsch." These were printed at Mainz in 1485 and 1491 respectively. But thirty years ago new light was thrown on its origin by an Italian authority, Professor Giulio Camus, who found in the Biblioteca Estense at Modena two manuscripts belonging to the fifteenth century. One of these, in Latin, is a treatise on simple medicines, of which the other, in French, is a translation. According to Professor Camus, the Latin manuscript is the work which went through many printed editions, and was popularly known as the "Circa Instans," from the first words of its introduction, which begins, "Circa instans negotium de simplicibus medicinis nostrum versatur propositum," &c. This has long been attributed by medical historians to Matthæus Platearius, a physician of Salerno in the twelfth century. The "Explicit" of this Latin manuscript is reproduced in facsimile in Professor Camus's memoir, "L'Opera Saleritana 'Circa Instans' ed il testo primitivo del 'Grand Herbier in Francoys,' secondo duo codici del secolo XV, conservati nella Regia Biblioteca Estense." It runs: "Explicit tractatus herbarum Dioscoridis et Platonis atque Galieno et Macrone translatate, mañu et intellectu Bartholomæi minid' senis in arte speciarie semper infusus." Some French verses are also reproduced. In these we read, "Il a esté escript Millcccc cinquante et huit." It appears, therefore, that the work "Circa Instans" was not written in the twelfth century by the Salernitan physician, Matthaeus Platearius, but by one "Bartholomæus minid' senis" (? de Senis) in the year 1458. As Professor Camus's memoir was published in 1886, it is somewhat strange that no reference to it is to be found in the recent "Geschichte der Medizin" of Neuberger and Pagel, where the "Circa Instans" is still referred to as the work of Platearius. From this one may infer that the memoir is not well known—an inference supported by the fact that it lies hidden away in the "Memorie della Reglia Accademia di Scienze, Lettere ed Arti in Modena," ser. 2, vol. iv, 1886, p. 49. It is worthy of a separate existence.

As the French manuscript of the "Circa Instans" is another version of "Le Grant Herbier," the text of our own "Grete Herball" is, therefore, derived from the same source. The preface and supplement, however, seem to find their origin in the German "Herbarius zu Teutsch" and the Latin "Hortus Sanitatis."

The woodcut figures which illustrate the first and second editions of the English work number 478, but they call for no special remarks. Unlike the illustrations in the later herbals of Turner, Lyte, and Gerard, they are of no importance in the history of botanical illustration. The majority, taken from those in the French edition, are reduced and inferior copies of the cuts in the German herbals mentioned above. In this instance one cannot do better than quote Pulteney: "Many are fictitious and many misplaced. In a variety of instances the same figure is prefixed to different plants, and in very few are they sufficiently expressive of the habit, to discriminate even a well-known subject, if the name applied did not suggest the idea of it. In some, these icons are whimsically absurd, especially in the animals and minerals."

Two later editions of the herbal appeared in England in 1539 and 1561, but these are less interesting than the editions printed by Treveris. One was printed by Thomas Gibson, and is entirely without cuts, while the other, printed by John King, only contains two figures of a man and a woman representing the male and female mandrake, the male figure being repeated at the beginning of the treatise on urines.

Title.—The great herball | newly corrected. | The contents of this boke. | A table after the Latyn names of all | herbes. | A table after the Englyshe names of all | herbes. | The propertees and qualytes of all | thynges in this booke, | The descrypcyon of urynes, how a man | shall haue trewe knoweledge of all seke- | nesses. | An exposycyon of the wordes obscure and | not well knowen. | A table, quyckly to fynde Remedyes | for all dyseases. | God saue the Kynge. | Londini in edibus Thome Gybson | Anno | M.D.XXXIX. [*The above title surrounded by woodcut border of classic design.*] Black letter, fol., 4 prel. ll., A—Z^4, Aa—Bb^4, Cc^6.

The introduction in the first and second editions of 1526 and 1529 is omitted in this, and its place taken by "The prenter to the reder." The address at the end of the text of those editions, "O ye worthy reders," &c., is also omitted, and instead of the original 505 chapters there are only 481. An edition bearing the date 1550 is recorded in Ames, and referred to by Pulteney, but I have been unable to trace it, no such edition being found in modern catalogues and bibliographies. The following is what is generally accepted as the fourth edition.

Title.—The greate Herball, which | geueth parfyte knowledge & un- | derstandinge of al maner of her | bes, and theyr gracious vertues, whiche God hath ordeyned for | our prosperous welfare and health, for they heale and cure all ma- | ner of diseases and sekenesses, that fall or mysfortune too all | maner of creatures of God created, practysed by many | experte and wyse maysters, as Auicenna, Pandecta, | and more other, &c. ¶ Newlye corrected and dili- | gently ouersene. In the yeare of our Lord | God. M.CCCCC.LXI. [*Woodcut different from that in editions of 1526 and 1529.*]

Colophon.—Imprynted at London in | Paules churcheyarde, at the signe of the Swane, | by Jhon Kynge. In the yeare of our | Lorde God. M.D.LXI. Black letter, folio, ✠^{6}, A—X^6, Y^8, Aa^6, Bb^2.

The three cuts have already been described. This edition follows that of Treveris more closely than does Gibson's. The original introduction, "Consideringe the grete goodnesse," &c., and the address at the end, "O ye worthy readers or practisiens," &c., are both included, and the "Table" gives 503 chapters.

Turner's Herbal.

The first original English botanist of the sixteenth century was William Turner, Dean of Wells, Protestant divine, controversialist, and physician. He was born about 1510-15, and in 1531 was a Fellow of Pembroke Hall, Cambridge. Like his German contemporary botanists, Turner was a pronounced Lutheran, who threw himself heart and soul into the work of the reformers. He was, therefore, in constant trouble, and for preaching without a license was imprisoned and afterwards banished. Crossing to the Continent, he travelled extensively, studying botany under Luca Ghina at Bologna, and taking a medical degree either there or at Ferrara. On the accession of Edward VI, he returned to England, was appointed physician to the Duke of Somerset, became Dean of Wells in 1550, but was deprived of his office by Mary in 1553. He again crossed to the Continent and renewed his botanical studies, having a garden at Weissenberg and another at Cologne. When Elizabeth came to the throne in 1558, Turner returned, and was reinstated in his deanery, but four years later was again in trouble, being suspended for nonconformity. He died in 1568.

Turner has been called "The Father of English Botany," and justly so. He was the first English botanist who studied plants scientifically, and his work marks a new era in the history of the science in England. The superiority of his herbal over any of the earlier English publications is recognized immediately the comparison is made. This was published in three parts, the first in 1551.

Title.—A new Her- | ball, wherein are conteyned the names of Herbes in Greke, La- | tin, Englysh, Duch, Frenche, and | in the Potecaries and Herbari- | es Latin, with the properties | degrees and naturall places of | the same, gathered and made | by Wylliam Turner, | Phisicion unto the | Duke of So- | mersettes | Grace. | Imprinted | at London by Steven | Mierdman. | Anno 1551. | Cum Priuilegio ad imprimendum solum. | And they are to be solde in Paules Churchyarde.

Colophon.—Imprinted at London, By Steuen Myerdman, and they are to be soolde in Paules | churchyarde at the sygne of the sprede Egle by | John Gybken.

The title is within an elaborate woodcut border, the Royal Arms being at the top. On each side is an upper and lower figure (four in all), and between them the royal letters "E.R." The printer, Mierdman, was an Antwerp workman who came over to England as a Protestant refugee. The bookseller Gybken was also an alien member of the trade. The part is dedicated to "Edward Duke of Summerset." The second part was not published till eleven years later (1562) at Cologne by another printer, Arnold Birckman.

Title. | The seconde parte of Vuil- | liam Turners herball, wherein are conteyned the | names of herbes in Greke, Latin, Duche, Frenche, and in the | Apothecaries Latin, and somtyme in Italiane, wyth the ver- | tues of the same herbes with diuerse confutationes of no | small errours, that men of no small learning haue | committed in the intreatinge of herbes | of late yeares. | . . . | . . . | . . . . | . . . | set furth by William | Turner Doctor of Physik. | [*Printer's mark.*] Imprinted at Collen by Arnold Birckman. | In the yeare of our Lorde M.D.LXII. | Cum gratia et Priuilegio Reg. Maiest.

This is dedicated to Sir Thomas Wentworth. The third part was printed in 1568, together with new editions of the first and second parts. This was the complete edition, published also at Cologne by the same printer, Birckman.

Title.—The first and seconde partes | of the Herbal of William Turner Doctor in Phisick, late- | ly ouersene, corrected and enlarged with the Thirde parte, lately ga- | thered, and nowe set oute with the names of the herbes, in Greke | Latin, English, Duche, Frenche, and in the Apotheca- | ries and Herbaries Latin, with the properties, | degrees, and naturall places of the same | . . . | . . . | . . . | set furth by William Turner Doctor | in Phisick. | God saue the Quene | [*Woodcut of Royal Arms.* | Imprinted at Collen by Arnold Birckman, In the yeare | of our Lorde. M.D.LXVIII. | Cum Gratia & Priuilegio Reg. Maiest.

The second part has a separate title-page. So also has the third.

Title.—The thirde parte of Vuil- | liam Turners Herball, wherein are conteined the | herbes, trees, rootes, and fruytes, whereof | is no mention made of Dioscorides, | Galene, Plinye, and other | olde Authores. | God saue the Quene. [*Woodcut of Royal Arms.*] Imprinted at Collen by Arnold Birckman, In the yeare | of our Lorde M.D.LXVIII. | Cum gratia & Priuilegio Reg. Maiest.

The first part of this complete edition of 1568 is dedicated to Queen Elizabeth, and the third to "the right worshipfull Felowship and Companye of Surgiones," &c.

Turner's early work consisted chiefly of the identification of the plants described by Dioscorides and other ancient writers. When he published his first botanical work, "Libellus de re herbaria," 1538, being then a Fellow of Pembroke Hall, he could "learne neuer on Greke, neither Latin nor English name euen amongest the Phisiciones of anye herbe or tre, such was the ignorance in simples at that tyme, and as yet there was no English Herbal but one, all full of unlearned cacographees and falselye naminge of herbes." In this work, and in the Herbal, Turner used his classical scholarship to good purpose, and, as can be seen from his own prefaces, he claimed for himself considerable originality—a claim which has been allowed by modern botanists, although practically ignored by his European contemporaries and immediate successors. This was due, doubtless, to his fearless and searching criticism, which contemporary herbalists resented. But while Turner criticized freely, he did so honestly, and gave praise wherever he thought it due. "Brunfels, Fuchsius, Gesner, Bock," he writes, "haue greatly promoted the knowledge of herbs by their studies, and haue eche deserued uery muche thanke, not only of their own countries, but also of all the hole common welth of all Cristendome."

His studies and extensive travels on the Continent gave him abundant opportunities of observing and collecting plants, and to these enforced absences from England is perhaps due not a little of Turner's originality. "I went into Italye and into diuerse partes of Germany to knowe and se the herbes my selfe, and to knowe by practise their powers and workinge, not trustinge onlye to the olde herbe wiues and apothecaryes (as manye Physiciones haue done of late yeres), but in the mater of simples myne owne eyes and knowledge: wherefore I have somthinge of myne owne to present and geue." He was therefore not afraid to expose the errors even of those whom he praised. In a letter to Fuchsius he "dyd frendlie admonishe him of certeyne erroures that were in his herball." Matthiolus, physician to the Archduke Ferdinand and to the Emperor Maximilian II, and the chief commentator of Dioscorides, naturally came in for a good share of criticism. With his interpretation of the classical writer Turner did not agree, and wrote, "Because Matthiolus is a learned man, therefore by the opinion of his learninge even wythoute good reason and autorite maye drawe other after him into his error; for the defence of the trueth, I will confute hys error both wyth reason and sufficient authorite." Again, with regard to the same author, he writes: "I borrowed verye littel or ellis nothinge of Matthiolus, and when as the herbal of Matthiolus came out in Latine, many thinges that were thought straunge both unto English men and Germanes, were nether straunge nor unknowen unto me, because I had learned the same before of my maisters in Italye. . . . Yet do I graunte that of his herbal I learned somthinge, but not so addicte unto him, but that I wrote against him in some partes of my Herbal, where as I thought he erred, and they that haue red the first part of my herbal, and haue compared my writings of plantes with those thinges that Matthiolus, Fuchsius, Tragus, and Dodoneus wrote in ye firste editiones of their Herballes, may easely perceyve that I taughte the truthe of certeyne plantes, whiche these aboue named writers either knew not at al, or ellis erred in thē greatlye. . . . So that as I learned something of them, so they ether might or did learne somthinge of me agayne, as their second editions maye testifye."

I have quoted freely from Turner's prefaces as they reveal not only the nature and temperament of the man, but also his own estimate of the position he held among European botanists of his day. He was the only original English writer on the subject in the sixteenth century, and his herbal occupies in our own country a position similar to that which is held on the Continent by the herbals of the Renaissance scholar-botanists and physicians of Germany—Brunfels, Bock, and Fuchs—whose beautiful works mark the culminating point in the history of the herbal proper.

Turner's Illustrations.

Turner's work has just been described as the only original English herbal written in the sixteenth century. This statement, however, does not apply to the woodcut figures with which the book is illustrated. Whatever share may be claimed for our own country in the promotion of botanical studies during this period, it is clear that we contributed little or nothing to the history of the art of plant illustration as concerned with wood engraving. Nor can we lay claim to any original series of woodcut figures of plants in any preceding century. If we turn to Anglo-Saxon times and examine the figures in the manuscript versions of the "Herbarium" of Apuleius Platonicus—the most popular herbal in England at that period—we find that they are not original cuts drawn and engraved from Nature, but copies of a series of older figures, which are copies themselves of others older still. Their characters exhibit no trace of original work on the part of the Anglo-Saxon artists, and belong to the lowest period of Graeco-Roman or classical art. The first herbal printed in England with woodcut figures was the "Grete Herball" of 1526. The text of this, as already indicated, was a translation of the French work, "Le Grant Herbier," and the figures were inferior copies of those in the German works, "Herbarius zu Teutsch" and the "Hortus Sanitatis."

The next profusely illustrated English herbal was that of Turner, the complete edition of which, printed at Cologne in 1568, contained about 500 woodcut figures. These are markedly superior to those in the "Grete Herball." But the majority were not the work of an English artist, and for the originals we must go to the Continent, where, in 1530, a new era was inaugurated in the history of plant illustration by the publication of the great work of Otto Brunfels—"Herbarum vivæ eicones"—"living pictures of plants." These surpassed in a remarkable degree every other existing collection of plant figures, and were the work of an eminent engraver, Hans Weiditz, or Guiditius, who took for his models not the old conventional figures of the earlier copyists, but a new and original series drawn from the plants themselves with a beauty and fidelity that had never been equalled. But the culminating point in the history of plant illustration was reached twelve years later in the herbal of Leonhard Fuchs, "De historia stirpium," 1542, whose exquisite cuts were engraved by the eminent Strasburg engraver, Vitus Rudolphus Specklin, from drawings which faithfully depicted each plant with its own roots, leaves, flowers, seeds, &c. These surpassed even those of Brunfels, and not only remained unsurpassed, but have never been equalled by any other collection.

Now when Turner published his herbal it would be quite natural for him to endeavour to secure the best collection of blocks available. These belonged to Fuchs, who had two sets, one for the folio edition of his herbal, and the other for the octavo edition of 1545. The blocks of the latter were evidently borrowed by Turner's printer, and of the 516 employed by Fuchs more than 400 were used in the complete edition of the herbal printed at Cologne in 1568. The advantage of securing the loan of these blocks was probably the chief reason why the book, like Lyte's translation of Dodoens, was printed abroad. But a number of Turner's figures were not taken from Fuchs. Of these a few were copied from the smaller figures of Matthiolus, but the source of the remainder I am unable to state. They were probably engraved from plants collected by Turner himself.

LOBEL'S HERBAL.

Matthias de L'Obel, after whom the garden flower Lobelia takes its name, was, like Dodoens, another Flemish herbalist who contributed to English botany. He was born in Flanders in 1538. After studying under Rondeletius at Montpelier, and travelling over various parts of the Continent, he settled at Antwerp, practised medicine, and became physician to William the Silent. About 1569 he crossed over to England, and resided with his son-in-law at Highgate, where he died in 1616. He held the appointment of superintendent of the physic garden belonging to Lord Zouch at Hackney, and received later the title of Botanist to James I. His first work, written in conjunction with Peter Pena, a Frenchman, who was at one time physician to Louis XIII, bears the following title:—

Stirpium Adversaria Nova, | perfacilis vestigatio, luculentaque accessio ad Priscorum, pręsertim | Dioscoridis et recentiorum, Materiam Medicam. | Quibus propediem accedet altera pars. | Qua | Coniectaneorum de plantis appendix, | De succis medicatis et Metallicis sectio, | Antiquæ e[t] nouatæ Medicinę lectiorum remedioru | thesaurus opulentissimus, | De succedaneis libellus, continentur. | Authoribus Petro Pena & Mathia de Lobel, Medicis. |

Colophon.—Londini, 1571. | Calendis Januariis, excudebat prelum Tho- | mæ Purfœtii ad Lucretię symbolum. | Cum gratia Priuilegii. |

Underneath the title is a curious map of Europe and part of Africa, and the whole is an excellent specimen of copper-plate engraving. Like the complete edition of Turner and the herbals of Lyte and Gerard, Lobel's work has a fulsome dedication to Queen Elizabeth. Next comes a second dedication to the Professors of the University of Montpelier, followed by a Latin index consisting of six leaves. The text occupies the pages numbered 1 to 455, followed by an unnumbered single leaf containing an account, illustrated on the verso by two woodcuts, of the Plocamos of Portland and the legend of the barnacle shells producing wild geese.

The above volume forms the first part of the "Adversaria." The second was not published till 1605, when a re-issue of the original sheets of the first part with an entirely new title-page appeared with it. This was erroneously regarded by Pulteney as a second edition. It runs:—

"Dilucidæ | Simplicium Medicamenorum [sic] | Explicationes, | & Stirpium Adversaria . . . | . . . | . . . | . . . | Authoribus Petro Pena & Matthia de L'Obel medicis. | Quibus Accessit Altera Pars, cum prioris | Illustrationibus, Castigationibus, Auctariis, Rarioribus aliquot Plantis. | . . . | . . . | . . . | . . . | Opera et studio eiusdem Matthiæ de L'Obel. | . . . | Londini, 1605. Idibus Aprilis. | Ex Topographia Thomæ Purfootii."

On the back of the title are the Arms of James I, followed on the next leaf by the dedication to the Montpelier Professors. The dedication to Elizabeth is naturally omitted. The text of the work is made up of the original sheets printed in 1570, with the exception of the last leaf, which is reprinted, in inferior type on thinner paper, with a new colophon, but without the two woodcuts. This will be referred to later. The title of the second part begins:—

"Matthiæ de Lobel | . . . | . . . | . . . | . . . | Adversariorum Altera Pars," | &c., &c. [*continued at some length*].

Above are the arms of James I. This second part follows the first with a continuous pagination beginning on sig. Qq 2 (the new extra leaf to the first part having the sig. Qq [i]) and ending on page 549.

From the bibliographical standpoint, the first part of the "Adversaria" is of great interest. The irregularity in the printing of the last leaf gave rise to the extraordinary statement by Pulteney that Christopher Plantin of Antwerp, and not Purfoot, was the real printer of the work. Such however was not the case, and in the interests of English printing it is necessary to rectify this error, which has been copied by later writers. On examining Purfoot's publication of 1605, consisting of the first and second parts of the "Adversaria" (the first with the new title-page quoted above), preceded by another work of Lobel's—"Animadversiones in Rondeletii methodicam pharmaceuticam officinam"—he found that the first part of the "Adversaria" was notably superior to the rest of the volume, being printed in better type and on thicker paper. He therefore regarded it as a production of Plantin's Antwerp press, and the inference is that the last leaf bearing Purfoot's colophon, which was also printed with inferior type and on thinner paper, was added by Purfoot to give the work the appearance of one of his own publications. The fact that Plantin, in 1576, published another of Lobel's works, "Plantarum seu Stirpium historia," and appended the first part of the "Adversaria," precisely the same as that published by Purfoot in 1605, but with a new title-page and a different impression of the last leaf, was doubtless the foundation on which Pulteney based his statement. But why he should have overlooked the interesting extra leaf with Purfoot's colophon, which Plantin retained, it is difficult to say. It should have been quite obvious that Plantin would not have issued a work of his own with the colophon of another printer. However, the explanation of the whole affair is that Plantin, in his desire to append the "Adversaria" to Lobel's new work, purchased 800 copies of Purfoot's edition at the price of 1,200 florins, instead of printing the work afresh. To these he prefixed a new title-page bearing his own imprint, "Antverpiæ apud Christophorum Plantinum Architypographum Regium, M.D.L.XXVI." He also paid 120 florins for 200 of the 250 woodcut figures with which the work was illustrated. Considering the fame of Plantin's press, and the high standard of workmanship which he always maintained, the transaction is a compliment to London printing of that date.

Another interesting observation may be made with regard to the peculiar last leaf bearing Purfoot's colophon, which in the first edition of 1570 was unnumbered and evidently printed separately. It would appear that the number struck off was not large enough to complete all the copies of the "Adversaria" which remained after the sale of the first issue in 1570, plus the 800 impressions bought by Plantin in 1576. Purfoot, therefore, when he issued the remaining copies with a new title-page in 1605, would have to reprint the last leaf. And the absence of the two curious cuts representing the Plocamos of Portland and the legend of the barnacle shells is explained by the fact already stated that Plantin acquired the majority of his blocks in 1580. But these two particular cuts had evidently left his possession some time previously, for they are to be found in the Antwerp edition of the "Plantarum seu Stirpium historia," of 1576.

Another book by Lobel, printed in England, was a fragment of a larger work which the author intended to publish under the title "Illustrationes Plantarum." Pulteney informs us that Lobel did not live to finish it, but How says it was completed. The fact remains that the work never appeared in its intended form. This fragment was edited under the following title by William How, a botanist and physician, and author of a work published anonymously on British Plants.

"Matthiæ de L'Obel | M.D. | Botanographi Regii eximii | Stirpium Illustrationes. | Plurimas elaborantes inauditas plantas, | subreptitiis Joh: Parkinsoni | rapsodiis (ex codice MS. insalutato) | sparsim gravatæ. | Ejusdem adjecta sunt ad calcem | Theatri Botanici | *Αμαρτημαλα*. | Accurante Guil. How, Anglo. | Londini, | Typis Tho: Warren, Impensis Jos: Kirton, Bibliopolæ, in Cœmeterio D. Pauli, | 1665."

Another part of the manuscript was purchased by Parkinson, who embodied it in his "Theatrum Botanicum" of 1640. As will be seen later, from the title of his work, Parkinson did not attempt entirely to conceal this fact, but he did not adequately express his indebtedness by showing to what extent he had drawn on these papers of Lobel. For this he is severely criticized by How, who complains of his action in taking many of Lobel's observations and expressing them as his own.

Lobel's Illustrations.

One cannot close an account of Lobel's works and those of his contemporaries, Dodoens and Clusius, without observing not only how far their studies contributed to the history of the herbal in England, but also the proud position which their figures occupied in the history of botanical illustration. Lyte's important work, which ranked as a popular English herbal, was a translation of Clusius's French version of Dodoens' "Cruydtboeck," and it will be seen later that Gerard's herbal was in the main a translation of the final work of the same writer. Lobel's "Adversaria," on account of its being printed and published in London, and on account also of the author's close association with the study of botany in this country, can also be classed as an English herbal. But the popularity of these writers in their own country was due in no small degree to the zeal of the eminent printer, Christopher Plantin, at whose expense the large collection of beautiful woodcut figures which illustrated their later works were either engraved or got together. The blocks are preserved to this day, and may be seen by any visitor to the famous Plantin Moretus Museum at Antwerp. Owing to its being written in Latin, Lobel's "Adversaria" did not attain in this country the popularity enjoyed by Turner's herbal and Lyte's English translation of Dodoens.

Concerning the figures which were used to illustrate the first and second parts of the "Adversaria" printed by Purfoot, there is little to be said beyond the fact that the majority were purchased by Plantin and added to the large collection of figures which he gathered together and subsequently published separately. Many served to illustrate the "Cruydtboeck" of Dodoens published by Plantin in 1581, and also the work published in the same year, "Plantarum seu stirpium icones"—a collection consisting of all the woodcut figures of plants in Plantin's possession at that time. These numbered 2,181, the same number I believe which the Cruydtboeck contained. This collection was printed again in 1591. Both are arranged according to Lobel's scheme of classification—a scheme upon which his fame as a botanist chiefly rests. Plantin's edition of the "Plantarum seu stirpium historia," 1576, has been described as an enlarged edition of the "Adversaria." But this statement, which carries the inference that additions were made to the text itself, requires modification. Plantin's publication consisted of two distinct, although supplementary, parts, the first of which has the running title "Stirpium Observationes." The second part consists of the text of the "Adversaria," containing about 270 to 280 woodcuts, printed by Purfoot himself in 1570, in precisely the same state in which Purfoot issued it, without alterations or additions. Plantin simply added the work (with a new title-page and "Royal Privilege") to his own publication. Hence the title—"Plantarum seu stirpium historia. . . . Cui annexum est Adversariorum volumen." It cannot therefore be described simply as an enlarged edition of the "Adversaria." Nor would it be correct to state that the large Flemish "Kruydtboeck," consisting of upwards of thirteen hundred pages, and more than two thousand woodcuts, is merely a translation of Purfoot's edition. It is even much larger than the work of 1576, consisting of the "Stirpium Observationes" and the "Adversaria," the former of which contains about 1,470 figures. These figures have been regarded as derived from previous books, especially those of Clusius, but this statement also requires modification. About half were taken from the editions of

Dodoens and Clusius, but no less than 782 were expressly engraved for the work, the greater part by Antoine van Leest, and the remainder by Gerard van Kampen.

LYTE'S HERBAL.

Eight years after the publication by Purfoot in 1570 of the "Adversaria" of Lobel, there appeared the fine folio in English popularly known as "Lyte's Herbal." This was not the work of an original English botanist, but a translation of the French version by Charles de l'Escluse, 1557, of the Flemish Herbal or "Cruydtboeck" of Rembert Dodoens, published at Antwerp, 1554. Dodoens, although not an Englishman, has a special claim to remembrance in the history of English botany, as his Cruydtboeck in Lyte's translation was well received in this country, being considered, in the matter of arrangement, superior to the work of Turner. It was naturally more popular than that of Lobel, which was in Latin. His great herbal, "Stirpium historiæ pemptades sex," in which were gathered all his writings on this subject, together with the additional matter he had accumulated, became, as we shall see later, the foundation of the most popular of English herbals, that of Gerard, 1597. Like Turner and most of his contemporaries of the botanical Renaissance, Dodoens was conspicuous for his learning and attainments. The foremost botanist of his own country, he was born at Malines about 1517, and after studies at Louvain and the universities and medical schools of France, Italy, and Germany, he graduated M.D., and became physician to the Emperors Maximilian II and Rudolf II. Later he was Professor of Medicine at Leyden. His interest in the science of botany, and the opportunities he enjoyed for its study, made him one of the most industrious of European botanists, as is evident from the various works he published. Lyte's chief claim to remembrance does not lie in any originality in connexion with the book, but in the service he rendered English botany by his translation of this important work.

Title.—A Niewe Herball | or Historie of Plantes: | wherin is contayned | the whole discourse and per- | fect description of all sortes of Herbes | and Plantes: their diuers & sundry kindes: | their straunge Figures, Fashions, and Shapes: | their Names, Natures, Operations, and Ver- | tues: and that not onely of those whiche are | here growyng in this our Countrie of | Englande, but of all others also of forrayne Realmes, commonly | used in Physicke. | First set foorth in the Doutche or Almaigne | tongue, by that learned D. Rembert Do- |

doens, Physition to the Emperour : | And nowe first translated out of French into English, by Hen- | ry Lyte Esquyer. | At London | by me Gerard Dewes, dwelling in | Paules Churchyarde at the signe | of the Swanne. | 1578.

Colophon [*Printer's mark*].—Imprinted at Antwerpe, by me | Henry Loë Bookeprinter, and are to be | solde at London in Powels Churchyarde, | by Gerard Dewes.

The title is surrounded by an elegant woodcut border on which are figures of Apollo, Gentius, Mithridates, Aesculapius, Artemesia, and Lysimachus. The lower part represents the Garden of the Hesperides. The whole seems to have been taken from the original Cruydtboeck of 1554 and Clusius's French version of 1557, but an ornament of flowers at the top has taken the place of the coat-of-arms on the original block. On the verso of the title-page is Lyte's coat-of-arms, and a crest "a swan volant silver upon a trumpet gold." On the recto of the second leaf begins the dedication to Queen Elizabeth, followed, on the recto of the third, by an address "To the friendly & indifferent Reader." On the verso of this begin the commendatory verses addressed to Lyte by W.B., Thomas Newton, Wm. Clowes, and John Harding, and on the verso of the sixth is a woodcut portrait of Dodoens, whose preface and epistle to the reader, both in Latin, together with the appendix, follow on the recto of leaves seven, eight, and ten respectively. The last leaf carries the colophon and printer's mark of Henry Loë. The work is in black letter, and, considering the workmanship of the period, forms a handsome volume.

Lyte's translation, like the original, is divided into six books, and contains descriptions of about 1,050 species. This is an increase on the number in Turner, to whose work it is superior in the matter of arrangement—the species, descriptions, places, names, and medicinal virtues being reduced in the various chapters to a particular order which was followed by Gerard and Parkinson. The cuts also exceed those in Turner by nearly 400. As Clusius's French version contained numerous corrections and additions, Lyte's translation may really be regarded as a second edition of the original work.

Lyte's Illustrations.

The first edition, 1578, was printed at Antwerp in order to make use of the woodcut figures which were then in the hands of the Antwerp printer, and also, presumably, in order that Dodoens himself could keep in touch with the publication. On account of the title-page bearing the imprint "at London, by me Gerard Dewes," the work is sometimes referred to as a production of a London press, but this is not correct. Dewes's association with the book was that of publisher or bookseller, and the printing, as the colophon indicates, was carried out by Henry Loë at Antwerp. The figures have also been spoken of erroneously as having been acquired by the supposed London printer, and that Dodoens consequently met with considerable difficulties in his desire to publish his work in Latin. But as the work was not printed at London, the blocks never came to this country. They remained at Antwerp, and three years later were sold by the widow of Jean van der Loë to Christopher Plantin for the sum of 420 florins. Plantin used them, together with others which had been employed for the earlier works of Dodoens, Clusius, and De Lobel, for the great Latin herbal of 1583. This fact explains the reason why the later editions of Lyte's book, all printed at London, were published without figures.

Lyte's first edition contains about 870 cuts, and probably all of these, with the exception of thirty which are said to be new, were from the same blocks as were used for Clusius's translation, a large number of which were employed previously for the octavo editions of Fuchs's collection, 1545. Dodoens himself acknowledges that almost all the figures in his first edition were taken from Fuchs. But it would not be correct to state, as is generally supposed, that the figures in Lyte's edition were nearly all taken from Fuchs. Those in Lyte number about 870, whereas the cuts in Fuchs do not exceed 516. Nearly 360 therefore do not belong to Fuchs. These, or the greater part of them, were collected by Dodoens himself and employed for three other works which he published in 1563, 1568, and 1574, subsequent to the original edition of the Cruydtboeck in 1554, and prior to Lyte's translation of 1578. Whether the thirty in Lyte which are said to be original were executed for Lyte himself or not, I am unable to state. I should say they were probably supplied by Dodoens, who, in the interval between the publication of Clusius's French version and the English translation of 1578, had been hard at work collecting new figures and materials which he embodied in the three other works just mentioned. In the verses "in commendation of the work" by Thomas Newton at the beginning of the book there are indications that Dodoens was interested in the publication.

Great was his toyle, whiche first this worke dyd frame.
And so was his, whiche ventred to translate it,
For when he had full finisht all the same,
He minded not to adde, nor to abate it.
Till *Rembert* he, did sende additions store,
For to augment Lytes travell past before.

Three other editions of Lyte's translation were printed at London by Ninian Newton, 1586; Edm. Bollifant, 1595; and Edward Griffin, 1619. The titles are long and closely follow the first edition of 1578. Being without illustrations, they are of little importance, and it has not been thought necessary to reproduce them. Other editions are stated to have been published in 1589, 1600, and 1678, but no trace of these can be found.

A book purporting to be an abridgment of Lyte's translation appeared in 1606 under the title beginning: "Rams little Dodeon. A briefe Epitome of the new Herbal," &c. It is nothing more than a book of recipes, unworthy of being associated with the name of Dodoens.

GERARD'S HERBAL.

The most popular of all the English herbals was that of John Gerard (1545-1612). Gerard studied medicine, and in 1562 was apprenticed to Alex. Mason, a surgeon, twice warden of the Barber Surgeons' Company. He was admitted to the freedom of this company in 1569, appointed junior warden in 1597, and elected master ten years later. Although Gerard evidently attained some eminence as a surgeon, he is better known as a botanist or herbalist. For the study of plants he had the most favourable opportunities, being superintendent of Lord Burleigh's gardens in the Strand, and at Theobalds, in Hertfordshire. He also had a garden of his own in Holborn, and published a catalogue of the plants it contained in 1596. The first edition of his herbal has the simple title:—

The | Herbal | or Generall | Historie of | Plantes. | Gathered by John Gerarde | of London Master in | Chirurgerie. | Imprinted at London by | John Norton. | 1597 |

Colophon.—Imprinted at London by Edm. Bollifant, | for Bonham & John | Norton M.D.XCVII.

The title is in the middle of a fine copper-plate engraving of floral and figure design, showing four mythological male figures holding plants. Underneath is a garden. On the back of the title are the arms of Lord Burleigh, to whom the work is dedicated on the next leaf. The following eight preliminary leaves consist of laudatory letters from Lancelot Browne, Matthias de L'Obel, Dr. Stephen Bredwell, the Royal Surgeon, George Baker, and Gerard's own preface to the "courteous and well-willing Readers." Among them (B i to B 3 recto) are some verses. On the verso of the tenth leaf is a portrait of Gerard holding a branch of the potato plant. Underneath are his own arms, those of the City of London, and the Company of Barber-Surgeons. The whole work consists of 742 leaves or 1464 pages, the text occupying pages numbered 1 to 1392.

The most interesting point in connexion with this massive work is perhaps that which concerns its authorship. It is a matter that does Gerard little credit. Towards the end of the sixteenth century, it appears that the London printer Norton wished to bring out a translation of the great Latin herbal of Dodoens. He thereupon employed Dr. Priest to undertake the work, but either immediately before or after the translation was completed Dr. Priest, it is said, died, and Norton engaged Gerard, who at that time had a considerable reputation as a herbalist, to put the finishing touches to the work. From a fact which I have not seen recorded by any of Gerard's biographers—namely, that he held the appointment of curator of the physic garden belonging to the College of Physicians—I suspect that he was well acquainted with Dr. Priest, who was a Fellow of the College, and had a part in the preparation of the Pharmacopœia. It would not be unreasonable to suppose, therefore, that Dr. Priest took Gerard into his confidence and consulted him on various points in connexion with the work. In any case Gerard was probably acquainted with it, from the fact that he gained possession of the manuscript. But the discreditable part of the whole affair is that Gerard, in order that the work should not appear to be a translation, altered the whole arrangement and claimed it as a work of his own. The story is to be found in Johnson's preface to the edition of 1633, where he blames Gerard for "endeauouring to hide this thing from us, cauilling (though commonly unjustly) with Dodonæus whersoever he names him." What has been regarded as a somewhat remarkable oversight on the part of Gerard in allowing it to appear is a statement by Dr. Stephen Bredwell in his letter to Gerard, prefixed to the herbal, that "Dr. Priest for translating so much as Dodonæus hath hereby left a tombe for his honourable sepulture. Mr. Gerard comming last, but not the least, hath many waies accomodated the whole worke unto our English Nation." "But that," says Johnson, "which may serue to cleare all doubts, if any can be in a thing so manifest, is a place in Lobel's Annotations upon *Rondeletius* his Pharmacopœia, where *page* 59 he findes fault with Dodonæus for using barbarously the word *Seta* for *Sericum*; and with Dr. Priest, who (saith he) at the charges of Mr. Norton translated Dodonæus, and deceiued by this word *Seta*, committed an absurd errour in translating it a bristle, when as it should haue been *silke*. This place so translated is to be seen in the chapter of the Skarlet Oke, at the latter F. And Lobel well knew that it was Dr. Priest that committed this error, and therefore blames not Mr. Gerard, to whom hee made shew of friendship, and who was yet liuing: but yet he couertly gaue us to understand, that the works wherein that error was committed, was a translation of Dodonæus, and that made by Dr. Priest, and set forth by Mr. Norton."

Gerard's herbal, then, is in the main the "Pemptades" of Dodoens translated, "so that diuers chapters haue scarce a word more or lesse than what is in him." A few plants were taken from Clusius, and others from the "Adversaria," while fourteen were original descriptions. "The volume has many of Gerard's own remarks inserted, such as localities in various parts of England for scarce plants, and many allusions to persons and places now of high antiquarian interest. He lays claim to a purely scientific object, but accepts much contemporary folk-lore." The legend of the barnacle shells may be cited as an example, but this is scarcely to be wondered at when we remember that Turner himself was deceived by the fable. "His chief commendation," thought Johnson, "was that out of a propense good will to the public advancement of this knowledge he endeavoured to perform there in more than he could well accomplish, which was partly through want of sufficient learning." Johnson, nevertheless, exhorts his readers to think well of Gerard, and not blame him for these defects, seeing that he was wanting neither in pains nor goodwill to perform what he intended. But whatever credit may be due to Gerard, he certainly cannot be commended for his disingenuous remarks in relation to Dr. Priest's translation. In his own preface he writes: "Dr. Priest, one of our London Colledge, hath (as I heard) translated the last edition of Dodonæus, and meant to publish the same; but being prevented by death, his translation likewise perished."

A second edition was brought out, amended and corrected, by Thomas Johnson in 1633:—

"The | Herball | or Generall | Historie of | Plantes. | Gathered by John Gerarde | of London Master in | Chirurgerie | Very much Enlarged and Amended by | Thomas Johnson | Citizen and Apothecarye | of London."

The title occupies the centre of a beautiful copper-plate engraving. At the top are figures of Ceres and Pomona, with a garden between them. In the middle are figures of Theophrastus and Dioscorides, one on each side of the title. At the bottom is an ornament of flowers and herbs in each corner, and between these a portrait of Gerard—a reduced copy of that in the first edition. The preliminary leaves contain the dedications of Johnson and Gerard, the laudatory letters of Lancelot Browne, Matthias de L'Obel, Dr. Stephen Bredwell, and Surgeon George Baker. Among them are Latin verses. Then follow addresses to the readers by Gerard and Johnson, and a catalogue of Johnson's additions. Johnson's address consists chiefly of a long and important account of herbal literature from the earliest times. This edition is much superior to, and more accurate than, Gerard's first edition of 1597, and was so well received that it was reprinted practically word for word three years later, the only alterations being the errata of the previous edition. The editor, Thomas Johnson, was a very able botanist, and a prominent member of the Apothecaries' Company. Partly on account of his learning, he was made M.D. by the University of Oxford in 1643, in which year he published a translation of the works of Ambroise Paré. To his edition of the herbal, which contains about 2,850 descriptions, he added more than 800 new species, and about 700 new figures, besides numerous corrections. Ray gave it the name "Gerard emaculatus," and by Haller it was styled "dignum opus, et totius rei herbariæ eo ævo notæ compendium."

Gerard's Illustrations.

Gerard's cuts in the first edition of the work are the subject of some interesting remarks. With the exception of sixteen, they were not original. That is to say, they were not the work of any English artist, or engraved specially for the work. When the herbal was published in 1597, there was no English collection of blocks in existence, and Gerard, like his predecessors Turner and Lyte, was obliged to have recourse to one of the large series of figures which illustrated the herbals printed on the Continent. As Gerard's book was mainly a translation of the final edition of Dodoens, it would be quite natural to suppose that he would obtain the illustrations from the same source, but as all the figures which Dodoens used, together with those employed for the other Flemish herbals, were in the possession of Plantin at Antwerp, and as Gerard took pains to disguise the fact that his work was mainly a translation, it is probable that he had no particular desire to obtain the loan of these. Fuchs's collection, which Turner used, only contained about one-third of the number required, and would not serve Gerard's purpose. Norton, his publisher, thereupon applied to Nicolaus Bassæus, of Frankfurt, and obtained the loan of the blocks with which the herbal of Jacob Theodor of Bergzabern (or, as he is commonly called, Tabernæmontanus), was illustrated. This work, the "Neuw Kreuterbuch," appeared, the first part in 1588, and the second in 1591, but the figures, which exceeded in number those of Plantin's collection, were published separately in 1590 under the title "Eicones Plantarum." They were, however, not entirely original, and the majority were copied from the herbals of Lobel, Dodoens, Clusius, Fuchs, Matthioli, and Bock. It is thus obvious why so many of Gerard's figures closely resemble corresponding cuts in the works of those authors. Gerard did not make use of all these blocks, as those in his herbal number about 1,800 against some 2,200 in Tabernæmontanus. Of the 1,800, only sixteen are said to be original.

But the interesting point about these figures is that Gerard's knowledge of botany was not sufficient to guard him against the numerous pitfalls which their application to his descriptions presented, and the confusion which ensued exposed him to Johnson's charge that he endeavoured to perform therein more than he could well accomplish, which was partly through want of sufficient learning. It also transpires that Lobel was asked to correct his errors, but the assiduity with which Lobel complied with this request was such that Gerard stopped the process, and with bad grace accused him of having forgotten his English. Johnson tells us that Gerard had no great judgment in these figures, and "frequently put one for another, and, besides, there were many plants in those authors which he followed, which were not in Tabernæmontanus and divers in him which they wanted, yet he put them all together, and one for another, and oft times by this means so confounded all that none could possibly have set them right, unless they knew the occasion of these errors."

The cuts in Johnson's edition number, according to Pulteney, about 2,717, upwards of 700 of which are said to be new, but I have not compared the two editions. Pulteney says that Johnson procured the same cuts that Gerard borrowed, but Johnson himself, in his preface, tells us that he made use of "those wherewith the works of Dodonæus, Lobel, and Clusius were formerly printed." If so, they must have been lent by Plantin at Antwerp. I have compared a number in Johnson with corresponding cuts in Plantin's issue of Lobel's "Kruydtboeck," 1581 (which is supposed to have contained all the figures in Plantin's collection at that time), and judge them to have been printed from the same blocks. Plantin's printed collection numbered 2,181, which leaves about 536 to be accounted for. Whether or not these were also borrowed of Plantin, who in the interval had doubtless collected new figures, I am unable to say. The frequency with which the large collections of figures were either borrowed or copied makes a comparison very perplexing, and the issue is not important enough to warrant the large amount of time which such an undertaking would necessarily entail. Suffice it to say that Johnson's edition contained the largest number of cuts of any herbal extant.

PARKINSON'S HERBAL.

The last of the old English herbalists was John Parkinson, born in 1567, and died in 1650 at the ripe old age of 83. Like Turner, Johnson, and Gerard, he had a garden of his own containing many rare plants. Parkinson was apothecary to James I, and in 1529, upon the publication of his "Paradisus Terrestris," dedicated to Queen Henrietta Maria, he was styled by Charles I "Botanicus Regius Primarius." The "Paradisi in Sole Paradisus Terrestris: A Garden of all Sorts of Pleasant Flowers," &c., was his first work. A second edition was published six years after the author's death in 1656, and a facsimile reprint of the first edition has appeared during the last few years—an honour which has not been shared by any of the herbals, and an indication of the esteem in which the curious old sixteenth-century book is held in modern times. The work, however, does not concern us. It is merely a book for the gardener or florist, and does not come within the meaning of the term "herbal."

Parkinson's herbal, upon which he spent the greater part of his life, is a massive folio volume with the title:—

"Theatrum Bo- | tanicum: | The Theater of Plants. | Or, | An Herball of | Large Extent: | Containing therein a more ample and | exact History and declaration of the Physicall Herbs | and Plants that are in other Authours, encreased by the accesse of | many hundreds of new, rare, and strange Plants. . . . Shewing withall the many errors, differences, and | oversights of sundry Authors that have formerly written of | them. . . . Distributed into sundry classes or Tribes, . . . with the chiefe notes of *Dr. Lobel*, *Dr. Bonham*, | and others inserted therein. | Collected . . . by *John Parkinson* Apothecary of *London*, and the | Kings Herbarist. | And Published by the Kings Majestyes especiall priviledge. | London, | Printed by Tho. Cotes. 1640." |

The above is preceded by a fine copper-plate engraved frontispiece, with a shortened form of the title in the middle. On the left is a figure of Adam, and on the right, one of Solomon. There are also four other mythological figures, and at the bottom of the page is a portrait of the author. Following the title is Parkinson's address to the reader. Then comes the dedication to Charles I and the customary commendatory pieces in Latin and English. The rest of the work consists of 1,755 pages.

This is the largest of all the English herbals, the number of plants described exceeding those in Johnson by nearly 1,000, being almost double the number in Gerard's first edition. Altogether the descriptions approach 3,800. The title originally intended for the work was a "Physicall Garden of Simples," but Parkinson's incursions into the byways of botany, like those of his predecessors, were not easy or uneventful, and as time went on he changed the plan to comprehend a larger scheme. At the beginning of his preface he complains "that disastrous times, but much more wretched and perverse men have so farre prevailed against my intended purpose, and promise, in exhibiting this worke to the publicke view of all, that their extreame covetousnesse had well nigh deprived my country of the fruition." It was Parkinson's professed design, Pulteney tells us, "to make his work a *Materia Medica*; and if, in him, we meet with the qualities of plants estimated on Galenical principles, by the degrees of hot and cold, moist and dry, &c., it was the theory of the day, from which authors of higher eminence were not emancipated. He not only gives the opinions of the Greek and Roman physicians, but of the Arabians, and has translated from the moderns, and his contemporaries, whatever could illustrate his subject, and render it as perfect as the intelligence of the times would allow."

The ponderous volumes of Gerard and Parkinson have been described as the two main pillars of botany in England till the time of Ray. It is to be feared, however, that Gerard's work remained the more popular of the two on account of the superiority of his figures, but his learning and natural qualifications for the work do not appear to have equalled those of Parkinson, whose herbal was much more original. The papers of Lobel, which Parkinson purchased and incorporated into his work, have already been referred to under the name of that author. How accused Parkinson in rather bitter terms of making Lobel's observations his own, without expressing adequate acknowledgment, but it was Pulteney's opinion that whatever may have been the case in particular instances, the attack on the whole was uncandid.

Parkinson's Illustrations.

The text of Parkinson's first work, "Paradisus Terrestris," does not concern us, as it partook of the nature of a gardening book rather than that of a herbal. But in one particular respect it shares an interest common to all the herbals of the period—namely, that of botanical illustration. The woodcut figures which illustrate the work, although occupying no important place in the history of the art, unless it be that which marks its decline, are worthy of consideration. By this time the old wooden cuts which had given these herbals an artistic interest of the highest importance were being rapidly superseded by engravings on metal. Our own country, compared with Germany, Italy, and the Netherlands, had added little to the general history of the herbal, and to the art of botanical illustration it had contributed less. Turner's, Lyte's, and Gerard's figures were almost all of German or Flemish origin, but in Parkinson's "Paradisus," although many were copied from Clusius and Lobel, the majority were probably original. All were cut afresh, and were the work of an English engraver. On this account they are worthy of attention, although from the artistic standpoint they are of no importance. The figures in the "Theatrum" were mostly copies of those in Johnson's edition of Gerard, but less in number by about 100. Like those in the earlier work, they were all newly cut.

CONCLUSION.

With the publication of Parkinson's "Theatrum" in 1640, the period of the old English herbal ended. The works of the well-known writers, Nicholas Culpeper and William Cole, published within the next twenty years, are not included. It may also be necessary to state why the writings of the great British botanists, Morison, Ray, Grew, and others, are not described. With regard to these latter it must be observed that they were botanists in the more scientific sense, rather than herbalists, and that by the time their books appeared, the science of botany had grown up to an independent position and was no longer a branch of medicine. After this period, the popularity of the herbal declined, and on account of the great revolution in botanical studies the large number of herbals which have appeared since Parkinson's day are of little or no importance.

Concerning Culpeper and Cole, who were industrious exponents of astrological botany and the doctrine of signatures, little need be said. Their works only tend to bring the literature of herbals into disrepute. Astrological botany—a belief in the influence of the moon and stars upon plants—goes back to ancient times, and it is, perhaps, a measure of Culpeper's quality that he revived this absurd superstition when the learned herbals of the scholar physicians and botanists of the Renaissance had done so much to raise the herbal above such false and engrossing beliefs. According to the doctrine of signatures, many medicinal herbs indicated by some external characteristics the diseases for which they were remedies. With regard to this doctrine, it is perhaps only necessary to add that the late Dr. Paris regarded it as "the most absurd and preposterous hypothesis that ever disgraced the annals of medicine." It is not claimed, however, that the learned herbalists, whose works form the subject of the latter part of this paper, were entirely free from superstition. They were not, but with the doctrine of signatures and astrological botany they had little to do, and their works contain many definite refutations of various superstitions. Their works must be judged, not in the light of twentieth-century standards, but by a comparison with their contemporaries and predecessors.

For the loan of the old herbals exhibited when the abstract of this paper was read my thanks are due to Mr. Bernard Quaritch and the Master of the Society of Apothecaries. English works only form a short chapter in the general history of the herbal, and to those who desire a survey of the whole range of this fascinating literature during its best period the recent book by Mrs. Arber (Cambridge University Press)—the only modern English work on the subject—is recommended.

The Lady Sedley's Receipt Book, 1686, and other Seventeenth-century Receipt Books.

By LEONARD GUTHRIE, M.D.

THE Lady Sedley's Receipt Book is a small quarto MS. volume bound in vellum. The date, 1686, is written on the cover, and on the first page, "The Lady Sedley, her Receipt Book, 1686," is inscribed with elaborate pen-flourishes. It consists of 75 pages containing 140 receipts, sixteen of which are culinary and the rest medical, mostly herbal, for the use of major and minor ailments; a few of them are cosmetic. The first 58 pages of the MS. are written in a good legible hand, the lines are carefully ruled and the headings are bold and ornamental. Subsequent entries, however, are in different and less educated handwriting, the ruled lines disappear, the headings are less ostentatious and the whole work shows signs of haste or carelessness in execution.

Prescriptions for major ailments include five for dropsy, two for palsy, eight for stone or renal colic, two for ague, five for plague, four for small-pox, five for scurvy, two for bite by mad dog, one for "poyson," three for jaundice, "yellow" and "black," two for "Ricketts," two for convulsions, and two for consumption. Others are for piles, gripes, incontinence of urine, cough, epistaxis, headache, constipation, worms, sore breasts and eyes, "Tetters" or herpes, toothache, short breath, fistula. One is for the "riseing of the Lytes," the nature of which mysterious affection is explained by a prescription for "ye riseing of ye Loungs, or Phtisick," contained in Mary Doggett's MS. Receipt Book of the same period, to which further reference will be made. Lady Sedley's prescription consists of a pennyworth of saffron steeped in red rose water. After several of the more important receipts the words "Probatum est," or "It hath very often been proved" are added. One thus marked is for dropsy. Horehound, hart's tongue, liverworth, wormwood and "sorrill," of each a large handful, were baked in a barley meal "pye." The "pye" was then cut into small pieces and allowed to stand three or four days in four gallons of new ale or new strong "beere." A great draught of it was to be taken fasting night and morning. "If you keep an extraordinary and temperate diet, drinking nothing else, it will cure the dropsy in three weeks." But to make this more perfect, "put into the Stanne of ale or beere a quarter of an ounce of salt of wormwood." Whatever may be said of the other effects of this beverage, there can be no doubt as to its diuretic properties. Another "proven remedy" is "The most excellent Receipt of the Wound Water." This contains southern wood, wormwood, buglos, mugworth wood, bettonie, sanacle, plantin, dandelyons, ribworth, campions of the garden, bramble buds, egrimony, wild angelica, cumfrey, hawthorn buds, mint, scabious, strawberry leaves, all kinds of honeysuckle, annis, violet leaves, oak leaves, cyncefold (cinquefoil), daisy roots, adder's tongue, of each one handful. These were boiled with a bottle of white wine and a gallon of running water until the fluid was reduced to half its bulk, then boiled again with a quart of honey and kept close stoppered for use. Three spoonfuls was the dose, night and morning until a quart was consumed. "Besides this, if it be an old sore or ulcer apply a playster of Honey and wax. This cureth all wounds, venom'd breasts, putrefyed bones, causing them to scale; ache in the stomach, it breaks an imposthume, stenches the blood of veins broken in the body and causeth bullets to fall out of the body wounded."

Internal healers of wounds and ulcers were called *Traumatics*, and external healers were known as *Vulneraries*, but were also used internally. Sir Kenelm Digby's or Talbor's "Sympathetic Powder,"[1] which consisted of powdered vitriol applied not to the wound itself, but to rags taken from it, and was "capable of curing green wounds and the toothache," does not find a place in Lady Sedley's book. But a prescription of Digby's for *Aqua Mirabilis* is given in full. It is practically the same as that of Salmon's "New London Dispensatory," 5th edition, 1696. "Take of cloves, galanga, cubebs, mace, cardamoms, nutmeg, ginger, āā one drachm; juyce of celandine lb. ½, spt. of wine lb. j, white wine lb. iij. Infuse them twenty-four hours and draw off in B. M. (Balneum Mariae, "water bath") two pounds." According to Salmon, *Aqua Mirabilis* is "Cephalick, Pectoral, Stomachick, Cardiack, Hysterick, Carminative, Anodyne, and Analeptic, of great force against the cholick, pains in the side and stomach, coldness of the ventricle, coughs, asthmas, and most diseases of the head and the brain. It comforts the heart, revives the spirits, helps swooning fits, provokes the terms, is a counter poyson and antidote against the plague, pestilence and pestilential distempers. It is said to preserve from the apoplexy and restore speech lost. Dose, from three drachms to an ounce."

---

[1] Cf. "A Discourse of the Cure of Wounds by Sympathy," by Nath. Highmore, London, 1651.

Remedies such as *Aqua Mirabilis* were appropriately called "*Polychrest*" (Πολύχρηστος) having "manifold or almost general virtues." One of these is introduced with much parade in Lady Sedley's book as:—

"A copy to make the sovreigns't water that ever was devised by man, which Dr. Stephens a physician of great cuning and of long experience did use and therewith did many great cases, and all was kept in secret until a little before his death, when the Archbishop of Canterbury got it from him as follows:—

"Take a gallon of Gascoyn wine, then take Ginger, Galingall, Camell, Cinamint, Tolliänders, Nutmegs, Cloves, Aniseed, of each one drahm, then take Sage, Mint, Red roses, Thyme of the moor, Pellitory of the wall, Rosemary, Wild Marjorum, Pennyroyal, Thyme, Lavender and Avens" (Caryophyllata). All these were to be bruised together and distilled in a limbeck.

"The virtues of this water be these: It conforteth the spirits vitall, and preserveth greatly the youth of man, and helpeth the inward diseases coming of cold, and against shaking of the palsy, it cureth the contraction of the sinewes, it helpeth the conception of women that be barren, it killeth wormes in the body, and killeth the cold gout, and helpeth toothache, it comforteth the stomach very much, it cureth the cold dropsy, it helpeth the stone that is in the bladder, and in the reines of the back: it cureth the canker, it helpeth shortly a stinking breath, and whosoever useth this water ever and anon, and not often, it preserveth him long in good liking, and shall make one seem young a long time."

With such "polychrest" remedies as these in hand, one wonders why others should be sought. Dr. Stephen's water (Aqua Stephani) was incorporated in Salmon's Dispensatory, 1696, and also in Quincey's "Complete English Dispensatory," 11th edition, 1739, as "a cephalic, a Cordial and Carminative, and likewise something Hysterical, if the Penniroyal be left out." Dr. Stephens died aged 98, shortly after the Restoration of Charles II. He was the author of the "Catalogue of the Oxford Botanical Gardens."

We find in Lady Sedley's book formulas by well-known physicians, including Sir Thomas Witherley, Dr. King, Dr. Greaves, Richard Lower, Dr. Hntent and the great Sydenham himself. Witherley, King and Lower attended Charles II in his last illness, and King was the physician who, Evelyn says, "with extraordinary dexterity, resolution and presence of mind, at once bled his Majesty, or he had instantly died that moment." The Privy Council ordered him £1,000 for his promptness, which, however, he never received, probably because doubts were soon entertained as to the correctness of the treatment and the diagnosis of apoplexy on which it was based.

Dr. Raymond Crawfurd has recently discussed the problem, and concludes that Charles II died of uræmia ("Last Days of Charles II"). King's treatment was therefore not inappropriate at the onset, but, unfortunately, it seems to have been carried out subsequently with more zeal than discretion, and may have accelerated death. Macaulay's charge that the physicians "tortured him for some hours like an Indian at the stake" is not unwarranted when one reads of the repeated venesections, the "vomits and purges, the cantharides blister 'universo capiti'"; the Burgundy pitch plasters to the soles of the feet, and other forms of drastic medication which were employed.

Dr. King's prescription for "The griping of the Gutts" adopted by Lady Sedley is simple: "Take a penny loaf, and slitt it, and toast it, and spread it over with Venice Treacle, and dip it in sack boyled with cloves, cinnamon and nutmeg, tye it up in a cloath, and lay it to the navel."

At this period medicaments were thought to find a ready way to the intestines *per umbilicum*, and vermifuges were commonly applied to the navel instead of taken internally.

Sir Thomas Witherley supplies Lady Sedley with an "ale" and "Dyett drink for the Gout": "Take six or seven gallons of Wort made of a bushell of Malt, put to them a handfull of Hopps, boyle these herbs an hour, then infuse in them the shavings of Sassafras and Guaiacum of each 2 oz., Liquorice an oz., Raysins stoned 2 oz., Ground Ivy, Ground Pine, Sage and Germander of each two large handfulls, boyle these with a very gentle fire close covered up untill a gallon wast, when it is cold straine it and work it up with yest, and keep it in a fitt vessel having in the vessel in a bag a pound of Antimony in powder. After 4 to 5 days you may draw it into bottles and drink it for your comon drink." It is not stated whether the addition of antimony was designed to produce an emetic effect.

Dr. Jacob, of Canterbury, contributes as medicine for the stone "15 grains of Goate's blood in powder dranke every morning in Asses' milk or other milk." He was seemingly unaware that thirty years previously Sir Thomas Browne in his "Pseudodoxia Epidemica" had exploded the fallacy that goat's blood is lithontriptic. Dr. Jacob's other recipe is for "giddiness of the head." It consists of powder of male peony root, powdered peacock's dung and nutmeg, of each ½ oz. As much as would lie on a sixpence was to be taken in four spoonfuls of black cherry water. All these remedies were regarded as cephalics and specifics for giddiness and the "falling sickness." The practice of supplying children with necklaces made of dried peony root and henbane to protect them from convulsions was recommended in the 1739 edition of "Quincy's Dispensatorie," but is not mentioned in the edition of 1746.

Sir Edward Greaves, who had the distinction of being the first physician to be created a baronet, supplies a "Receipt for Convulsion Fitts," consisting of peony roots, dead man's skull, hoofs of asses, white amber and bezoar made into a julep or emulsion. Bezoar stones were concretions found in the stomach of the Capricervus, orientalis and occidentalis, or "deer goat," and were accounted excellent for vertigoes, epilepsies, megrim, and in fact for nearly all diseases. They were equally efficacious as amulets or as internal remedies.

The great Sydenham's "Prescription for the head" illustrates his teaching: "The more numerous the simples the more potent the medicine," for he adds Roman wormwood, orange peel, angelica and nutmeg to Venice treacle, which already contained seventy-two ingredients. But the dose was only the quantity or 'bigness' of a nutmeg, and was directed to be washed down with a diuretic draught containing horseradish, elecampane, garden scurvy grass, white horehound, tops of Roman wormwood, centaury, broom, chamomile flowers and juniper berries infused in five pints of sack.

"Dr. Lower's receipt for ye Scurvey" is simple and unpretending: "Take a pound and a half of Dock roots, three handfulls of Hart's tongue, four handfulls of Dandelion roots, put them in a bagg to 4 gallons of small ale." Richard Lower was the eminent anatomist who is supposed to have played the part of "ghost" to Thomas Willis in preparing his work on the brain.

There are four other prescriptions for scurvy in the Sedley book, two of which are a distinct improvement on Lower's, for one contains twelve lemons sliced thin in addition to the juice of scurvy grass, brooklime, watercresses, briony, horseradish and nutmegs, the whole to be infused in 8 pints of Rhenish wine. Three spoonfuls were to be taken night and morning, and "you must abstaine from all salt meat, swineflesh, butter and wine." The other prescription (Sir Thomas Witherley's) includes orange and lemon peel, and 4 oz. of orange juice.

Three other prescriptions are preservative against plague and pestilence. Two of them are guaranteed "by God's help to protect against plague for the span of a whole year" if taken for nine days and nineteen days respectively. They are chiefly remarkable for the large quantities of ginger which they contained. This, no doubt, imparted a sensation of cheering warmth to the epigastrium of those who were panic stricken at the approach of plague, and thus assured them that protective agents were at work on their behalf. Recently I was told of a practitioner who during the cholera scare prevalent in the late "eighties" achieved great renown by supplying an "anti-cholera mixture" containing chiefly cardamoms, capsicum and ginger, to his patients. Another "most soveraigne and approv'd Preservative above all others for the purging away of the plague" is by one M. D. Hintent. It consisted merely in the formation of an issue on the inner side of the left arm, half way between the wrist and the elbow.

There are two prescriptions for rickets, a disease first described by Whistler in 1645, and five years later by Glisson. Glisson attributed rickets to ill-health, delicacy or indiscretion on the part of the mother during pregnancy, and to feeding the child on a cold moist diet, such as melons and cucumbers, or on crude and oily substances such as fish, salt meat, butter and cheese, with excess of confections, spices and pickles; air, cold and moist, or very warm and relaxing; too much exercise or not enough; too frequent bathing in warm water; the use of oily relaxing liniments, and too soft linen, especially if moist, were contributing causes. His treatment aimed at correction and gentle evacuation of the "morbific matter" by means of laxatives, clysters and very mild emetics. Incidental symptoms such as "rheums," gripes, worms and teething received attention, and he accounted about thirty herbs, roots, and simples as "Specifics" for the disease, besides flowers of sulphur and preparations of steel. He also applied strengthening ointments and liniments to the joints and limbs, and used exercises and splints to correct deformities.

Lady Sedley's prescriptions for "ricketts" are but gleanings from Glisson, apparently designed to meet all the complications as well as the symptoms of the disease itself. Both are "Dyett drinks" containing figs, raisins, currants; herbs such as betony, egrimony, hart's tongue, liverwort, colt's foot, scabious, parsley, water cress, cumfrey and liquorice. But the menstruum of one is "faire water," and of the other "strongest ale," three quarts evaporated to half its bulk, and with half a pint of muscadine added thereto. "You must give the child 2 spoonfulls in the morning fasting, 2 after dinner when it goes to sleep, and 2 at night going to bed. This is to be continued till the quantity be all taken." The remedy was certainly calculated to induce sleep, but it may be hoped that the aqueous infusion was more in general use than the alcoholic. If we may judge from a letter of about this period, or a little later, concerning Prince James, son of James II, dandling or bouncing the child up and down was regarded as an essential part of the treatment for rickets.

"The royal Prince" (James, son of James II) "is in best of health and grows more beautiful every day. I . . . . feel regret at seeing the manner of his bringing up, so different from ours. The thing that troubles me most is seeing him bounced up and down on pretence that it is necessary to do so to cure an ailment which we call ricketts, which attacks babies."

Letter from Donna Vittoria.

"Montecuccoli, Davia.

"Le petit prince, habillé comme en godenot (mannikin) mais beau, gai, qu'on élève en dansant.[1]

"Mme. de Sévigné."

Judging by the Lady Sedley's selection of their prescriptions, eminent physicians of her day do not seem to have been in any way emancipated from the general credulity and superstition which prevailed concerning old-time remedies. Prescriptions culled from non-medical sources were no doubt quite as efficacious as those provided by the faculty. And therefore we find receipts for stone by the Duke of Monmouth and by Judge Ellis,[2] and by the Lady Mildmay for fistula. His receipt for stone contained Venice turpentine distilled with various herbs and spices in small ale. It was only to be made in the month of June, and was to be taken "three days before the full, and three days before the change of the Moone." The Duke of Monmouth relied on ripe haws, fennel roots, distilled in white wine and taken with syrup of elder.

The Lady Mildmay's cure for fistula was a herbal drink, but for a speedy cure "you may tent the wound or sore, and lay thereon a Colworth leafe."

---

[1] "The English Court in Exile," by E. and M. S. Grew (Mills and Boon), pp. 92-3.

[2] Judge Ellis was raised to the Bench in 1673 and died "grandævus Senectute," aged 71, in 1680. His shield of arms is to be seen in one of the windows in Gray's Inn Hall.

Lady Sedley's Snayle Water—good for obstructions of the liver and for consumption—was a distillation of snails and earth-worms, with many herbs and spices, added to strong ale.

Oyle of Swallows.—Every part of the swallow was considered good for some or other disease, and especially for dimness of sight and the falling sickness. The "oyle" itself was made by pounding in a mortar "ten or twelve young swallows ready to fly together with their gutts and feathers." They were then boiled with lavender, thyme and sage in fresh butter. The compound was strained through a linen cloth and used for sprains and weakness of the sinews.

One of the prescriptions for toothache, which is not however endorsed "Probatum est," is very puzzling: "Take a pint of white wine vinegar, take the quantity of 3 beere glasses of the finest Venice glass, putt all the Venice glass into the fire when you must burn it until such time as it is ready to dissolve to nothing. Then take it out of the fire and put it into the white wine vinegar, when if it be not burnt it will melt and dissolve to nothing. You must when you are troubled with the Toothache take some thereof warm in a dish, then take a mouthfull and keep it in your mouth as long as you can without swallowing, for to swallow much on't would be as bad as ye poison."

The loathsome remedies derived from human and other urine and excrement which are found in pharmacopœias of the day are only represented in two of Lady Sedley's prescriptions. One of these for "giddiness of the head" (Dr. Jacob's) contains peacock's dung, and the other, for black jaundice, is an infusion of sheep's ordure in Rhenish wine.

It must be remembered that nothing was considered so common or unclean that virtue could not be extracted from it in the shape of "spirit, salt and sulphur" by means of heat. Willis speaks of several cases in which fresh human urine was efficacious in gout and scurvy. The various preparations of urine owed such value as they possessed to the urea, carbonate of ammonia and other salts which they contained. Willis describes the infusion of horse dung as "a vulgar but no contemptible remedy in pleurisy and jaundice," and says that the fæces of birds and animals owe their virtue to the volatile salts contained therein.

Cosmetics.—Interspersed with directions, "How to cook a calf's head, "how to make black puddings," and other culinary advice, are several recipes, such as "For a redd face"; to take away "red rubies that growe on the face by reason of the heate of the Liver"; to "make haire growe," and to take it away; to make the teeth white; and to remove "ffreckles" or "morphew," a term which also included "ringworm." Oil of peach-kernels and gourd seed and plantin water were chiefly used for the complexion. An ointment of bees roasted on a shovel and boiled in salad oil was used to make hair grow. Leeches baked to powder and mixed with brandy "cause hair to grow, when the bald place is also anointed three times with the blood of a mole."

Tetters, or canker, which includes herpes and any scaly eruption, was treated by bathing with rock alum, honey, sage, rosemary, and columbine in strong ale; or by celandine, bay salt and lemon juice—hardly a soothing application, one would think, in cases of herpes. Celandine (chelidonium) still forms the basis of some patented corn and wart cures.

"The Lady Sedley's Receipt Book" is of some historical interest, for she was the wife of Sir Charles Sedley, wit, writer of plays and sonnets and boon companion of Charles II. She was the daughter of John Savage, Earl of Rivers, and married Sir Charles Sedley, February 23, 1657. Their only child and heiress was the notorious Catherine, Mistress of James II, and created by him Countess of Dorchester. My reason for believing that the Lady Sedley, to whom the Receipt Book belonged, was the wife of Sir Charles, is that no other person entitled to her description appears in "Guillim's Heraldry," published in 1679.

Those who are familiar with Samuel Pepys's Diary will remember sundry references to Sedley's mad pranks and dissolute behaviour. In 1663, he, Lord Buckhurst, and Sir Thomas Ogle got drunk at the "Cock" in Bow Street and caused a riot by their grossly indecent conduct, for which Sedley was find £500. In 1668, he and Lord Buckhurst again scandalized everybody by running "sans culottes" about the Strand. On this occasion the King took their part, and Pepys feared that the Lord Chief Justice Keeling would "lay the constable by the heels" for daring to arrest these fine gentlemen. Again in October, 1668, Pepys repeats the gossip that the King, Sedley, and Buckhurst were all drunk together at Saxham Pepys's allusions to Sedley are, however, not always uncomplimentary. On two occasions when he sat near him at the play, he found his audible comments on the performance "mighty witty." The practical side of Sedley's humour is shown in his treatment of Kynaston, the actor. Kynaston fancied himself on his resemblance to the fashionable Sedley, and made himself up to look still more like him. Whereupon Sedley hired a "bravo" to thrash him and to pretend that he really mistook him for Sir Charles Sedley. According to his biographer,[1] "The King never would part with Sedley, so he never would part with the King," although "his estate was never the better for the court," and his "morals much the worse." Charles liked him because he never asked him for anything, whereas the other courtiers were always begging of him. "The King singled him out for the best genius of the age, and frequently told his familiars that Sedley's style either in writing or discourse would be the standard of the English language."

Sedley wrote a large number of poems and sonnets, and also three plays, besides collaborating in the composition of others. But his works hardly bear out Charles's estimate of them, though he is still remembered as the author of the charming lyric, "Phyllis is my only joy." His verses are neat and simple in diction, and not quite so coarse as those of Rochester, Buckingham, and even Cowley in some places. They are mostly, as Rochester described them, "mannerly obscene."[2] His plays, of which "Bellamira," or the "Mistress," has been accounted the best, are both tedious and licentious.

In 1680, Sedley met with an accident thus recorded in the Hatton correspondence (Camden Society, vol. i, p. 216): January 15, $16\frac{79}{80}$: "Yesterday ye roof of ye Tenis Cote in ye Haymarket fell down. Sir Charles Sedley, being there, had his skull broke, and it is thought it will be mortall. Sir George Etheredge and several others were very dangerously hurt." Another account of the accident given in the Memoir (op. cit.) is that "It was at the acting of his play called 'Bellamira' that the roof of the playhouse fell down. But what was particular was that very few were hurt but himself." His "merry friend," Sir Fleetwood Shepherd, told him "There was so much fire in the play that it blew up the poet, house and all." Then, lest the poet should be unduly elated, he added: "No, the play was so heavy it broke down the house and buried the poet in his own rubbish."

It may have been partly on account of this accident or for domestic reasons hereafter mentioned that Sedley withdrew from London as much as possible after the death of Charles II, but he did not retire from political life. Several of his speeches in Parliament as member for New Romney are included in his printed works. A passage from the last of these, delivered in 1699 during a debate on a "Bill for disbanding the Army," will bear quotation. It ends: "If we are true to ourselves, 10,000 men are enough; and if not, 100,000 men are too few." He died in 1701.

---

[1] Cf. Works of the Hon. Sir Charles Sedley, with memoir of the author's life written by an eminent hand, 1776.

[2] "For songs and verses mannerly obscene,
That can stir Nature up by springs unseen,
And without forcing blushes, warm the Queen,
Sedley has that prevailing gentle art
That can with a resistless charm impart
The loosest wishes to the chastest heart." (Lord Rochester.)

Catherine, daughter of Sir Charles and the Lady Sedley, was born in 1657. Evelyn described her as "none of the most virtuous but a witt." She was pale, and squinted, and was otherwise so plain that Charles II said that he supposed she was prescribed to his brother James by his confessor as a sort of penance. She professed herself unable to account for James's infatuation for her. "It cannot be my beauty," she said, "because everyone knows I have none, and it cannot be my wit, because he is too foolish to appreciate it." Howbeit, there can be no doubt that she exercised a singular fascination over James and others. She posed as a Protestant, and use was made of her liaison with James for political reasons. The climax was reached when she was created Baroness Darlington and Countess of Dorchester on January 19, 1686, with an allowance of £5,000 per annum. This was a deadly insult to the Catholics, and Queen Mary was so much incensed that she went on "hunger strike" for two days. James only succeeded in persuading her to take food by scourging himself in her presence. The Queen kept the scourge and afterwards bequeathed it to the Convent of Chaillot, but the Countess eventually got the money. James seems to have had a rather unpleasant time with his Queen and a roomful of her priests and confessors, and the result was that Catherine was ordered to withdraw from Whitehall and advised to pay a visit to Flanders. She objected to Flanders on the ground that "the number of convents there would render the air too oppressive," and she went to Ireland instead. But, not liking Dublin, she returned in August, 1686. James immediately fluttered back to her side, but the reunion did not last long. Her political importance was gone for the time and her pension remained unpaid. Her father, Sir Charles Sedley, does not seem to have been on good terms with his august son-in-law. He was instrumental in procuring the accession of William and Mary, and remarked afterwards that he and James were even, for, "if he has made my daughter a Countess, I have helped to make his daughter a Queen." In return for Sedley's good offices, the Countess received a grant of £1,500 a year from William and Mary in May, 1691, and in 1703 her original pension of

£5,000 a year was restored by a grant of the Irish Parliament. In this year she was conspicuous at the Coronation of George I as the wife of Sir David Colyear, afterwards Earl Colyear, whom she married in 1696. Ultimately, like Becky Sharp, she is said to have become pious. She died at Bath in 1717.

Of the Lady Sedley herself, we have little information beyond that which may be inferred from the "Receipt Book" which she compiled. There is a note, however, concerning her in Burnet's "History of my own Times" (vol. iii, Ed. Oxford, 1823, p. 114), which is of interest. Referring to her daughter—Lady Dorchester—one of the editors, "D.,[1]" writes: "The best excuse that could be made for her was that her mother, Lady Catherine Sedley, had been locked up in a mad-house many years before she died." But it is clear that she must have been in full possession of her senses in the year 1686, when her book was commenced. As we have seen, the year 1686 marked an important epoch in the lives of the Sedley family. It coincided with the retirement of Sedley from the court, and with the social ostracism of the Lady Dorchester. We may well imagine that poor Lady Sedley welcomed the return of her wayward husband and erring daughter to the family seat at Southfleet; surely her famous "cordialls" and "wound waters," her cures for ailments of the head, stomach, liver, and kidneys were designed to patch up the damaged constitution of the one; whilst her face washes, unguents, and cosmetics might serve to impart to the other, some of the loveliness which Nature had denied her. Moreover, in order to keep them with her, she must feed them well, and hence her excellent recipes for table delicacies. These reflections lead one to attach a faint tinge of romance to the faded pages of the Lady Sedley's Receipt Book.

OTHER RECEIPT BOOKS OF THE PERIOD.

There are probably many MS. Receipt Books like Lady Sedley's hidden and forgotten in the libraries of old country houses. Several manuscripts of the kind are to be seen in the MS. Department of the British Museum. The most important is "Mary Doggett: Her Book of Receipts, 1682" (No. 27466, Sloane). A MS. note on the first page says: "This Mary was the wife of Doggett the Player who left a legacy of a yearly coat and badge to be rowed for." The competition for "Doggett's Coat and Badge" amongst Thames watermen still takes place annually in August. Thomas Doggett's original announcement of the ceremony, on August 1, 1716, was as follows: "This being the day of his Majesty's happy accession to the throne, there will be given by Mr. Doggett an orange livery with a badge representing Liberty, to be rowed for by six watermen that are out of their time within the year past." Mary Doggett's "Book of Receipts" is in large 4to, folios 307. It is beautifully written throughout, in handwriting much resembling that of Lady Sedley's amanuensis at its best, and contains an index of "Waters and Phisicall Receipts for the Stillatory." It includes cookery and miscellaneous receipts such as "How to Sonse a Pigg"; "To wash Parti-coloured stockings"; "To make Perfumes and Sweete Baggs"; "To Pickle Cowcumbers," and to "Collar Beef," besides many medical prescriptions from various sources: Dr. Lower's "Bitter Infusion with Filings of Steele," and the method of making "Puppy Water," a distillation of a young fat puppy and a pint of "fasting spittle" in a quart of new butter-milk, 2 quarts of white wine, lemons, egrimony and camphire.

---

[1] "Earl of Dartmouth.

The MS. next in importance (Sloane, 1367) is "My Lady Ranelagh's Choice Receipts, as also some of Captain Wilks, who valued them above gold." It is undated. It is a long narrow volume, like a modern washing book, containing 83 folios and 292 recipes in small cramped handwriting. It has an alphabetical list of herbs and their values, and also an index of chemical and astronomical symbols, and a key to "our own abbreviations." The prescriptions are culinary and medical and are taken from medical and other authorities (including Lady Ranelagh's sister, the Countess of Warwick, of whom more anon) and from printed books and pharmacopœias of the period.

Sloane, 556, is "A booke of Medicens collected, being most of them pv̄d medicens to healp. Written by Mr. Anthony Lewis, the 23rd day of January 1696 out of a booke which was the La. Marquies Dorsetts."[1] Recipes for cooking, farriery, and medicine are included in it.

Sloane, 28956, contains recipes for medicine and cookery, chiefly in the writing of members of the "Ellis" family, possibly including Judge Ellis, whose receipt for stone has been mentioned.

---

[1] Anne, daughter of the Earl of Cumberland, married first, Richard, Earl of Dorset, and secondly, Philip, Earl of Pembroke. A portrait painted of her during widowhood provides her with two recipe books; and another, painted when she was aged 13, contains a large assortment of learned books.

Seventeenth-century-printed Books of Culinary and Medical Recipes.

The first and most important of these is by Elizabeth Grey, Countess of Kent (1581-1651) and is entitled, "A choice Manual of rare and select Secrets in Physick and Chirurgerie, Collected and practised by the Countess of Kent (late dec'd)," 12mo. The second edition, which is the earliest in the British Museum, was edited by W. Jar and appeared in London in 1653. It went through nineteen editions and the Lady Kent's "Testacious powder," consisting of white amber, crab's eyes (i.e., concretions in the heads of crabs, not the eyes themselves) and "corall," hartshorn and pearl, was of such repute that it was included in Quincy's Dispensatory, 1739.

"The Ladies Dispensatory, containing the Nature, Virtues, and Qualities of all Herbs and Simples usefull in Physick, reduced into a Methodicall order, for their more ready use on any Sicknesse, or other accident of the Body, the like never published in English," is by Leonard Sowerby, and was printed in 1652. The author in his preface states that it is based on the works of Dioscorides, Gerard, Goræus, and Fuchsius. At the end there is an alphabetical "Table of the Virtues of the Simples" contained in this book. It is comprehensive, for it contains remedies suitable for treatment of the "bitings of Shrew mice," "The bitings of Crocodiles and Cockatrices," "The Venomes and poysons of Toads and Greene Froggs," and of many other noxious insects and reptiles. Some of the morbid conditions which are mentioned, and for which treatment is prescribed, may seem out of place in a "Ladies Dispensatorie," but the book was no doubt intended to meet domestic emergencies of the most intimate kind and character.

"The Ladies Cabinet, Enlarged and Opened, containing many rare Secrets and Rich Ornaments of severall Kindes and Different uses, Comprised under three general heads—viz., (1) Preserving, conserving, candying, &c.; (2) Physick and Chirurgerie; (3) Cookery and Housewifery; whereunto added Sundry experiments and choice extractions of Water Oyles, &c. Collected and practised by The late Right Honourable and learned Chemist, the Lord Ruthven."

The second edition of this pretty little book, with additions and a particular table to each part, was published in London in 1655. I do not know when the first edition appeared, but it seems to have been used as a model for "the Queen's Closet Opened," the first edition of which, Dr. A. W. Oxford informs me, was not published till 1657. The tenth edition of the latter work, published in 1696 with a preface by "W. M.," is entitled "The Queen's Closet Opened, being incomparable Secrets in Physick, Chyrurgery, preserving and candying, &c., which were presented to the Queen by the most experienced Persons of the times, many whereof were had in Esteem when she pleased to descend to private Recreations." The Queen was of course Henrietta Maria. It is a neat 12mo volume divided into three parts: (1) "The Pearl of Practice"; (2) "The Queen's Delight"; (3) "The Compleat Cook." A table of authorities gives the names of Edward VI, Queen Elizabeth, Charles I, Queen Mary, Lady Elizabeth, daughter to Charles I. Edward VI and Queen Elizabeth supply recipes for perfumes, Charles I and his Queen one for the plague, which the Lord Mayor had from the Queen. "There is no medicine more excellent than this when the sore doth appear, than to take a cock chick and pull it, and let the Rump be bare, and hold the Rump of the said chick to the sore, and it will gape and labour for life, and in the end die; then take another and a third, and so long as any one do die; for when the poyson is quite drawn out the chick will live, the sore presently will assuage, and the party recover. Mr. Winlour proved this upon one of his own children; the thirteenth chick dyed; the fourteenth lived, and the party cured." The physicians whose names are attached to prescriptions are twenty-five in number, amongst whom are Dr. Mayhern (Sir Theodore Mayerne), Dr. King, Dr. Bates and Dr. Stephens, several surgeons and an oculist "Master Stepkins." (Red rose water with "Lapis Tutiæ," obtained from the fumes of melting brass which adhere to the sides of the furnace.)[1] W. Laud, Archbishop of Canterbury, contributes Dr. Stephen's water and the Bishop of Worcester an "admirable curing Powder" of crab's claws, musk, civet, ambergreese, adder skin and hartshorn. The nobility are represented by Viscount St. Albans ("the ale of health and strength"), Lord Spencer (cherry water) and Lord Sheffield ("for the cough of the lungs") and by the Countesses of Arundel, Worcester, Oxford, Kent, Rutland; Ladies Mounteagle, Abergany, Nevil, Spotswood, Denny, Gifford, Hobby, Leonard, Smith, Goring, Mildmay, Bray, Dacres, Thornburgh, Mallet, and others. Sir Kenelm Digby's "Aqua Mirabilis" occurs, and also a cordial water of Sir Walter Raleigh's—a gallon of strawberries infused in a pint of aqua vitæ. Amongst the commoners the name of Master Lucatello is given. The balsam of Lucatellus is contained in Lady Sedley's book, and also in Quincy's dispensatorie. It was an internal

---

[1] In the "Southsea Castle" MS. of Recipes in the Royal College of Physicians' Library (1663-1671) "*Tutia*" "for the sight" is said to have been advised to the Emperor of Constantinople in the year 1438, "at ye Synod of Ferrara, and with good success."

"Vulnerary" and cough cure made from olive oil, wax and Venice turpentine with red Saunders in canary wine. The law is represented by Mr. Justice Hutton, who, like his learned brother Judge Ellis, contributes a receipt for the stone.

It is evident, therefore, that in compiling her own "Receipt Book" the Lady Sedley was but following the example of many other ladies of position in her day. Evelyn says of the women of his youth that "their recreations were in the distillatorie, the knowledge of plants and their virtues for the comfort of their poor neighbours and the use of their family."[1] Both in the sixteenth and seventeenth centuries, part of the education of women included acquaintance with the preparation and medicinal use of herbs and simples. But the well-meant efforts of noble ladies to use their knowledge of therapeutics on behalf of their poor neighbours was not altogether approved by the faculty. Dr. Walter Harris writes in 1689 of "country people who, lying at a considerable distance from physicians, are supported by my Lady's Cordials out of Charity, which her Ladyship exhibits promiscuously in every disease with very great applause; for be the event what it will, the Cordial, to be sure, must never be blamed."[2] Sydenham also complained that "Nowadays every house has its old woman, or practitioner, in an art that she has never learnt, to the killing of mankind." And to judge from biographies and memoirs of certain great ladies of the seventeenth century, the complaints of Harris and Sydenham may not have been altogether groundless.

We find many notable examples of such noble women in "Home Life of English Ladies in the 17th Century," by the author of "Magdalen Stafford" (published 1861).

Most conspicuous amongst these was *Anne Countess of Arundel* (1595—1630), who turned her house into a kind of hospital, supplying "medicines, salves, plasters, and other remedies to all kind of people who either wanting will or means to go to Doctors and Chyrurgeons came to her for the curing of their wounds and distempers. And her charity herein was so famous that not only neighbours but several out of other shires, 20, 40 more miles distant, did resort unto her to that end, and scarce a day passed on which many did not come, sometimes more than 3 score in a day." As she usually gave "Almes in Money," besides advice and medicine, one is not surprised to hear that "some, now and then, would feign infirmities." She ordered divers kinds of drugs to be bought every year to make her salves and medicines . . . and would even be present at the making of them. . . . "Three score dozen of Sheepskins were spent some years merely in making the plasters she gave, and about 1 cwt. of one only matter, whereof some of 'em were made for aches and other accidents. Some she would take into her house for more than a quarter of a year, and others whom she could not cure of their distempers . . . she provided that they might be received into London Hospitals and cured. Others again I have known who, being dismissed from the Hospitals as incurable, she out of compassion has taken again into her own house and in the end has cured them, God especially assisting."—"The Life of Anne, Countess of Arundel," by H. G. F. Howard (Duke of Norfolk), published in 1857, p. 213.

---

[1] Mrs. John Evelyn was herself a notable housewife, from whom Evelyn probably obtained the recipes he appended to his "Acetaria." Her mother was Lady Brown, wife of Sir Richard Brown, our Ambassador at Paris. Lady Brown's house is described as "an Asylum for her exiled Countrymen and an hospital for the sick and needy" ("Home Life of English Ladies in the Seventeenth Century," p. 42).

[2] Walter Harris, "De Morbis Acutis Infantum," Martyn's translation, 1742, p. 61.

Lady Anne was the daughter of Lord Dacres; she married Philip, Earl of Surrey and Arundel. She was educated by her maternal grandmother, Lady Mounteagle, who also "did excel in the curing of diseases, wounds, and the like." Lady Mounteagle married secondly the Duke of Norfolk, who was beheaded in 1572. Prescriptions by Lady Dacres, Lady Mounteagle, and by the Countess of Arundel and her husband are contained in the "Queen's Closet Opened."

Lady Warwick (1625—1678) (née Mary Boyle, daughter of the Earl of Cork) married Robert Rich, afterwards Earl of Warwick. Burnet speaks of her as "a worthy sister of Robert Boyle and distributor of the fruits of his study of chemistry." Dr. Walker, for many years chaplain to her family, says in his funeral sermon over her: "If any were sick or tempted, or in any distress of body or mind, whither should they go but to the good Countess, whose closet or still house was their shop for Chirurgery and Physick?" She and her elder sister, Lady Ranelagh, probably collaborated in producing the "choice receipts" contained in her MS. already described. Moreover, the sisters had the advantage of co-operation with Mrs. Elizabeth Walker, wife of Dr. Walker, chaplain to the Warwicks, and afterwards Rector of Fyfield. Elizabeth Walker (née Sadler) left an autobiography, and her husband wrote a memoir from which we learn ("Holy Life of Mrs. E. Walker," by Anthony Walker, 1690) that she imparted to her daughters "whatever requires more art or curiosity for the Closet or the parlour, as preserving, drawing spirits in an Alembic, or cold Still, pastry, &c. . . . She caused her daughters to transcribe her best recipes for things which were curious, but especially for Medicines, with directions how to use them. For she was skilled both as a physician and surgeon, and one of her sisters being married to a very able doctor of the London College, she obtained from him 'many receipts' . . . and she was very inquisitive of other doctors, and had many English books, Riverius, Culpepper, Bonettus, &c., which she read, not to say studied. And good stores of vomits, purges, sudorifics, cordials, pectorals, almost all kinds of syrups, strong waters, several quarts of which she left (yea, gallons of them she used most)." These three ladies must have left very little for the local practitioners to do, considering that the apothecaries of the time were paid for medicines and appliances, but not for their advice. Amongst other ladies of similar tastes and pursuits may be mentioned Lady Maynard, who died in 1684. "She was a common patroness to the poor, and a common physician to her sick neighbours. Often she would with her own hands dress their most loathsome sores, and sometimes keep them in her home till cured" (funeral sermon by Bishop Ken).

Of *Lady Alice Lucy* we are told that "at all times when any wanted health . . . she cheerfully communicated whatsoever she conceived conducible to their recovery, having not only great store of cordials and restoratives always by her, but great skill and judgment in the application of them." (Extract from Memoir, "English Ladies of the Seventeenth Century," pp. 174-5).

Lady Anne Halkett (1622-1699), as we learn from her autobiography (Camden Society, 1875), also tended wounded soldiers, and distinguished persons came to her at Fyvie.

Lady Brilliana Harley's delightful letters to her "Sonn Edward," when an Oxford undergraduate in 1639, are full of affectionate advice as to the care of his health. She sends him a "Bessor stone" to keep in his pocket, 2 gr. of "orampotabily" (aurum potabile) with instructions for use, besides "eye watter" and other remedies. (Camden Society, 1853.)

The names of many more might be added to the list, and if, like Sydenham and Harris, we are inclined to cavil at these ladies' claims to practise an art which they had never learnt, to the "killing of mankind," we must, nevertheless, remember the woeful plight of therapeutics at the time. The simple herbal recipes of Lady Sedley and her like were harmless in themselves, and not a whit less based on ignorance and gross superstition than many which they prized as bearing the stamp of highest medical authority. But a new era in medicine was dawning at the time Lady Sedley compiled her book, though as yet it remained unrecognized.

One has only to look at the pharmacopœias of the period to see that the science of therapeutics was in a state of hopeless confusion owing to the multiplicity of remedies and to the extraordinary virtues with which each and all were credited. Hence it was that no prescription was considered complete unless it included nearly every drug which at one time or another had been reckoned good for the complaint which required treatment. Hosts of inert substances and incompatibles of every sort and kind were heaped together in reckless liberality. It can only be said in excuse of blind and irrational prescriptions that the quantity of any active drug which they contained was too small to do much harm.[1] But a revolt was taking place against methods of treatment which could be as well carried out by Lady Sedley, with the aid of a collection of formulas, as by the most skilful of physicians. One of the pioneers in this direction was Gideon Harvey (b. 1630-40), a kind of Paracelsus or "free lance" against the therapeutics of his day. With caustic wit he relentlessly exposed the fallacies and absurdities of the general methods of treatment in vogue. He was, no doubt, a scurrilous and unscrupulous person, yet, to his credit, he pleaded for simplicity in prescribing, and insisted, in contradiction to Sydenham, that the "fewer the ingredients the better is the medicine." His motive in inveighing against accepted modes of treatment was to convey the impression that he alone was the possessor of secret cures, but he succeeded in awakening criticism of the curious jumble of ill-assorted and mostly inert remedies which disfigured the London Pharmacopœia. Indirectly he was responsible for the reduction in number of preparations from 1,646 (Salmon's Dispensatorie, anno 1696) to 643 in Quincy's English Dispensatory, 1739.

---

[1] *Venice treacle* contained about 1 gr. opium in 4 scruples; dose, 1 scruple to 2 dr. *Mithridate*, 1 gr. opium in 4 dr. 2 scruples; dose, the same as of Venice treacle (Quincy).

BIBLIOGRAPHY.

MANUSCRIPTS.

"The Lady Sedley: her Receipt Book," 1686. (In writer's possession.)

"Mary Doggett: her Book of Receipts," 1682. (Sloane MS., No. 27,466, British Museum.)

"My Lady Ranelagh's choice Receipts, etc." (Sloane, 1367, British Museum.)

"A booke of Medicens collected, being mostly pv̄d Medicens to healp," by Anthony Lewis, 1696. (Sloane 556, British Museum.)

"Southsea Castle MS." (Royal College of Physicians Library, 1663-1671.)

"Mompesson MS." 1730, Medical Society of London. (Probably compiled by descendant of Mompesson, Rector of Eyam, whose services to his parishioners at the time of the Great Plague will be remembered.)

PRINTED BOOKS.

"A Discourse of the cure of Wounds by Sympathy," by Anthony Highmore, London, 1651.

Dispensatories (Salmon's, 1696, and Quincy's, 1739).

Crawfurd, Raymond, "Last Days of Charles II."

"English Court in Exile," by E. and M. S. Grew (Mills and Boon), pp. 92-3.

Burnet, "History of my own Times," Oxf. ed., 1823, note, vol. iii, p. 114.

"Dictionary of National Biography," Art., Sedley, Sir C.; Sedley, Catherine; Grey, Elizabeth, Countess of Kent.

Pepys, Samuel, "Diary," 1663-8.

Evelyn, John, "Diary," June 13, 1673; January 19, 1686.

"Works of the Hon. Sir Charles Sedley, with Memoir written by an Eminent Hand," 1776.

Camden Society, "Hatton Correspondence," i, p. 216.

Camden Society, 1875, "Lady Anne Halkett's Autobiography."

Camden Society, 1853, "Lady Brilliana Harley's Letters," 1639.

"Holy Life of Mrs. E. Walker," by Anthony Walker, 1690.

"Home Life of English Ladies in the Seventeenth Century," by the author of "Magdalen Stafford," 1861.

"Life of the Hon. Lady Anne, Countess of Arundel," p. 213.

PRINTED RECEIPT BOOKS.

"A Choice Manual of rare and select Secrets in Physick and Chirurgerie, collected and practised by Elizabeth Grey, Countess of Kent," (?) 1651-2.

"The Ladies Dispensatory," by Leonard Sowerby, 1652.

"The Ladies Cabinet Enlarged and Opened," 2nd ed., 1655.

"The Queen's Closet Opened," 1657.

PORTRAITS.

Godfrey Kneller's portraits of Catherine Sedley, Countess of Dorchester, and of Sir Charles Sedley, were sold at Christie's for £1,000 and 360 guineas respectively on February 28, 1913. These portraits were formerly in possession of the Rev. E. H. Dawkins, of Morhanger House Bedfordshire, and were purchased by Messrs. Agnew.

DISCUSSION.

Dr. DENNIS VINRACE said he felt that the Section was much indebted to Dr. Guthrie for his scholarly and historical paper. There was one point about which he felt some doubt—namely, as to whether the books such as had been described, dealing with botany and herbal remedies, were the foundations of the Pharmacopœia. Neither in Dr. Guthrie's paper nor in Mr. Barlow's on a cognate subject, was any mention made of the British Pharmacopœia. There was such a work in existence now, though he did not think anyone was guided by it or took much notice of it. He wondered whether in those early days the profession had to rely on the excellent works which had been quoted, or was there an authorized Pharmacopœia? He possessed a copy of the British Pharmacopœia dated 1627, in excellent condition, and it was interesting to see that it contained a number of remedies which still held their own. Another interesting reflection was as to plagiarism. According to Mr. Barlow's excellent paper, that was no new sin. He feared it still obtained, for perusals of the journals would show that every now and then a drug was re-discovered, with a claim to priority. It was highly important for medical men to study what had been done in the past, and he thought this Section must have a great influence in this direction.

Dr. GUTHRIE replied that he mentioned in his paper two of the Pharmacopœias which were practically based on the London Pharmacopœia. One was Salmon's in 1696. The second was Quincy's, which came out in 1739. They were the embodiment of the Pharmacopœias of the day, but with emendations by both Salmon and Quincy.

Examples of Old Drug-pots.

By J. D. Marshall.

In "Prehistoric Times" Lord Avebury says no fragment of pottery connected with pharmacy has yet been found, nor is there any evidence of palæolithic pottery. In Egyptian tombs small pots or jars are found made of terra-cotta unglazed. In addition to instruments, &c., pharmacy pots were often found during the excavation of Pompeii and Herculaneum, and are still shown in the museums of Naples and Florence. The pharmacy jars that are to us most interesting were those made in England from early Tudor times to late in the eighteenth century, and in Italy, Spain, France and Holland; we must exclude Chinese and Japanese entirely. These we call mediæval pottery and divide into Majolica and Faience, the former being the production of Spain and Italy, the latter being principally Dutch and English, and also being generally of a later date than Majolica. The material of which these interesting containers were made consisted of baked clay, surmounted by enamel or glaze.

The earliest examples of Majolica were Hispano Moresque lustre ware, made by the Moors during the period they occupied Spain, and by them undoubtedly copied from the Orient; they are decorated with Moorish designs and painted with metallic colours. They were principally made at Malaga, Toledo, Valencia and Barcelona. Good specimens of this ware are found in the British Museum and were made in the fourteenth and fifteenth centuries. Of far superior artistic design and finish are the familiar Italian Albarelli, the shape being an elaboration of a joint of bamboo in which drugs were packed and imported from the East in olden days; this shape was one easy to handle and so most appropriate for the purpose of storing drugs and galenicals. The most usual decoration was of one colour, being a combination of the horizontal bands and disks, with frequently some small ornament such as a trefoil or a little wavy line, very rarely the bands and disks alone. On some specimens, figures and faces are also painted and coats of arms or other insignia which are most rare; when the decorations are tints of one colour only they are called in "camaieu." As the art of the potter advanced the decorations became more beautiful and were executed in several colours, such as rich red, blue and green, the designs frequently being very ornate and beautifully executed, termed polychrome.

The earlier forms of Majolica were covered with a glaze containing lead, but the latter and more beautiful were glazed with a tin preparation. In the Musée de Cluny there are two vases dated 1500 with the word Faenza, which is considered the oldest factory of Majolica in Italy; the British Museum also contains several very beautiful examples of this date, specimens which I wish it were possible to show this audience, but which will well repay a visit to observe; the South Kensington Museum has another from Faenza inscribed Dia Chassia which has represented on it a man powdering drugs in a mortar—the man is sitting on the floor with the mortar between his legs.

In the latter part of the fifteenth century the Duke Guid Urbaldo II had a set of pharmacy jars made at Urbino for his domestic pharmacy, probably the most costly in the world. At his death his successor presented them to our Lady at Loreto, where they are still preserved. The Duchy of Urbino had several potteries which manufactured very beautiful pharmacy vases, one at Castel Durante being established as early as 1361, of which many specimens are still preserved.

France contributed considerably to the manufacture of faience, the rarest examples being made at Sainte Pochaire. The Museum of Rouen contains many specimens of rare beauty, and this manufacture is considered the most artistic in France. They were made in blue camaieu and polychrome, the shapes being exceedingly fine. Strasbourg faience is well known, there being a very considerable number of plates and dishes of the peculiar red rose colour with green flowers and birds as decorations, the same treatment of colour being used for pharmacy vases; they are of later date, 1700-1800. Belgium, Germany, and Sweden also had potteries which produced pharmacy jars and ewers, but they are of less interest and poor quality as a rule.

By the term Majolica we understand a pottery formed of calcareous clay, gently fired, and then covered with an opaque enamel composed of lead, tin and sand; the biscuit has generally a light yellow tint or colour, disappearing under the opacity of the enamel, and also it effervesces when treated with an acid.

According to Piccolpasso, a potter of Castel Durante, who wrote a book about 1548 describing and illustrating the various wares and patterns, and who says that Guido of Savonia, who learned the potter's art at Castel Durante, transferred his factory and assistants to Antwerp, which brings us to the very interesting and clever Dutch delft. This kind of pottery with reference to pharmacy jars is perhaps of primary importance; the beautiful colouring and surface of the tin enamel which formed such a good ground for painted decoration and at the same time concealed the rough earthen body of the ware was first made about 1600, and there is no doubt was the result of the very large trading interests that Holland had with China and Japan, from whence a large number of beautiful porcelain vases, &c., dating from the Ming dynasty, 1368 to 1644, were obtained, and even in those days were very valuable. Dutch and Italian potters strove to imitate as closely as possible to produce at home a ware that could compete in beauty and finish, as well as cost, with the blue and white Chinese porcelain that was imported, and this with a very considerable measure of success.

The method of manufacturing Dutch delft was as follows: The ware after being formed of carefully levigated clay, was baked into a biscuit state; it was then dipped into a tub of finely ground tin enamel held in suspension in water; when left to dry the moisture evaporated or was absorbed by the porous biscuit and a coating of white powder left on the surface. The piece was then painted and finally coated with a thin covering of transparent glaze of lead oxide; it was then fired for the second and last time. This system of decoration was applied to the "grand feu" in which only those colours were used that would stand the full heat of the furnace.

In the early part of the eighteenth century the practice of painting the finished ware with enamel colour which was afterwards subjected to the lower heat of the muffle kiln (au petit feu) became general, and this method is carried on very successfully at the Faience works of Boulogne-sur-Mer, where reproductions and original designs of many shapes and colourings are made in great quantities at the present time, and where I lately had the pleasure of seeing the modus operandi from the clay as brought from the pits through the various stages of puddling, enamelling, painting, firing, &c., &c., under the courteous and instructive ciceronage of the proprietor, who would I am sure be pleased to give welcome to any medical man who showed an interest in the work.

Some thirty years later than the date of the Dutch delft faience being started, the manufacture of delft was commenced in England by Dutch potters. As far as can be learned, Lambeth was the first of these potteries, where in 1671 John Ariens van Hamme took out a patent for making delft tiles after the way practised in Holland. Ultimately some twenty factories were at work in Lambeth, where pottery is still carried on as we all know by Doulton, Stiff and others, the clay being brought from various centres, much of it by water. Other towns, such as Bristol and Liverpool, became great centres where pharmacy jars were made; in Bristol Richard Frank and Thomas Flower were well-known makers in 1697. Liverpool became noted for its pharmacy jars, which were made by Zachariah Barnes, who made these jars a speciality. Early in the eighteenth century this pottery was the principal trade of the town and every merchant of note was concerned in its production. Seth Pennington, 1760, made fine punch-bowls and for a long time possessed the secret of a rich and choice blue. In the British Museum there is a beautiful drug-pot probably made by Pennington; the colour equals anything I have had the fortune to see.

The delft of Dutch origin and that made in Lambeth, Bristol and Liverpool is of similar shape and generally alike, but after a little experience of handling the ware of both countries less difficulty should be experienced in discriminating the origin of the specimens. If one compares the specimens in the British and South Kensington Museums, and even some of those I have the pleasure of showing this evening, it will be seen that although the English ware was made by a similar process, and generally followed the Dutch style, there is a marked difference; the Dutch delft has a body of finer and more carefully prepared clay, the biscuit is softer, thinner and more resonant, the glaze is thicker, and owing to the body being softer it was capable of absorbing more of the fluid enamel, and so is whiter and more lustrous. The English body is harder and coarser and less resonant, the glaze is thinner and has often a rosy tint due to the paste showing through, and it has less adhesion affinity to the biscuit, consequently being frequently crackled or crazed. The decorations of Dutch delft are perhaps the best guide, they being so far superior in skill of drawing and painting, often indeed highly artistic; the English decoration, on the other hand, is usually very crude or a poor imitation of the Dutch; the formation of the pieces is far neater and carefully worked in the Dutch, which is another guide. The colours used for faience were blue, manganese purple, and yellow, occasionally black, green and puce, with sometimes a poor red which turned brownish in firing.

In England dispensing pots were made from a very early date; although this statement has caused a strong controversy. Mr. Henry Wallis in his book, "The Albarello," claims that these small pots are undoubtedly of Italian origin, and questions whether they were imported as pottery filled with cosmetics or drugs. He further goes on to say: "The Italian writers on majolica will smile when they hear these particular albarelli were labelled in English museums and collections

English delft." The discussion arose principally on the specimens in the Guildhall Museum and the collection of Mr. Hilton Price lent to the Victoria and Albert Museum, all of which were excavated in London. An article in the *Burlington Magazine*, April, 1905, very ably differentiates and, I think, proves conclusively that most of these small pots were undoubtedly of English make. The writer showed that although the shape was a diminutive albarello, very rarely exceeding 3¼ in. in height, this was very much less than the ordinary albarello, which averages at least 7 to 8 in.

The form and decoration, having been learnt from foreign handicraftmen, were naturally strong in resemblance to the models from which the potters learnt their ideas, and also the fact that the native potters were keenly competing against imported pottery would be another cause for similar shape and decoration. Another peculiarity of the small London jars is the bevelled edge of the rim, which in Italian examples is almost invariably flat. They were probably made with the bevelled edge to hold in place the parchment tied over the mouth to preserve the contents.

An interesting proof of the albarello form being known as copied in this country during the Tudor period long before the introduction of enamelled wares are the two green glazed albarello shaped vases in the British Museum admitted to be of English origin. The general outline of form, as with the pharmacy jars, is also clumsy and thicker in the walls as compared with the Italian. The base also is a feature, being much more hollowed out in the London pots than in the Italian, which have an almost flat bottom. The motifs of the decoration have a strong Italian character, and were in many cases probably copied from a "pucca" albarello.

The evidence generally goes to show that every justification is given for collectors to label these pots English delft, although not necessarily Lambeth; the shape and motifs having been shown to be familiar to English potters and commonly used by them quite a hundred years after the date assigned by Mr. Wallis, and they were probably made near where they are most usually found—namely, in London—and not where no traces of them ever occur—that is to say, in Italy.

One of the greatest enjoyments to a collector of pharmacy jars is the hunting for them. I never go for a walk without haunting some back street or lane either in London or country towns, and several of my most treasured pieces have been picked up for the proverbial old song. Unfortunately, the price of specimens is constantly growing higher; so many people now appreciate these old pots, some no doubt for the quaint decorations, others for the shape; again, others for the inscriptions, to them most mystifying. A factor is no doubt the large collections owned by such men as my friend, Mr. Deutertre, who has over 360 most beautiful specimens; who has also given me most valuable help in preparing this paper, and we all regret he is not here to give us his personal reminiscences of the joys and disappointments of a collector. M. Comien, of Antwerp, has also a superb collection amounting to over 320 pieces.

The collection of Mr. Hodgkin, which was disposed of in 1903, contained many valuable and rare examples, of which I have two or three specimens, and I want gratefully to express my thanks to Mr. Woolley for arranging the slides and also permitting me to use his knowledge; also to Mr. Masker, who has so kindly lent me a selection of valuable specimens from his collection.

The authorities of the British and Guildhall Museums have been most courteous in granting facilities for photographing specimens. I only wish we had been allowed to handle them here.

In conclusion, I trust the audience will forgive my temerity in attempting a paper on such a subject as this. I am only a humble though enthusiastic collector, and I shall feel well repaid if others take an interest in the old utensils used by our predecessors in pharmacy.

Section of the History of Medicine.

May 28, 1913.

Sir WM. OSLER, Bt., F.R.S., President of the Section, in the Chair.

A Short Review of the History of Ancient Hindu Medicine.

By C. MUTHU, M.D.

(I)

ANCIENT CIVILIZATION.

> "Thou art the Garden of the world, the home
> Of all Art yields, and Nature can decree ;
> Even in thy desert, what is like to thee?
> Thy very weeds are beautiful, thy waste
> More rich than other clime's fertility."

THE history of Hindu medicine takes us back to times of remote antiquity. From the earliest time India captured the imagination of the world. A glory of romance and a veil of splendour cast a mystic spell upon all her achievements. Whether it be in the domain of art or science, in poetry or philosophy, in religion or mythology, in commerce or manufacture, Ancient India excelled in almost every department of human activity or enterprise for many many centuries. The Western Nations, from Dr. Johnson downwards, have been content to trace the beginning of their civilization to Ancient Greece and Rome, which they have regarded as the key to all their knowledge and foundation of all their science. But if an impartial student of comparative history were to trace the stream which brought nurture to the thoughts of Greece and Rome to its source, he would no doubt be surprised to find India at the very fountain head irrigating and fertilizing the rest of the countries of the world with its culture, commerce and civilization.

To know something about the history of medicine of the Ancient

Hindus it would be necessary to make a rapid survey of their civilization, their achievements in various fields of knowledge, and the part they played in the progress of the world.

The Antiquity of the Hindus.—The Hindus possess the oldest literature in the world in the hymns of the Rig Veda, which contain a history of the Aryas and of the ancient world from prehistoric times. Mr. G. Tilak, an oriental scholar, after careful and patient research into the astronomical allusions and references recorded in the old literature, has come to the conclusion that the oldest period in the Aryan civilization dates back from 6000 to 4000 B.C., which he calls the Pre-Orion period, when the Indians, the Parsees and the Greeks lived together in the common home. Professor Heeren calculates that the space of 6,042 years has elapsed from Dionysius (an Indian King) to Chandragupta. Megasthenes, the envoy of Alexander, discovered chronological tables at Polybhotra, the residence of this king, which contain a series of no fewer than 153 kings with all their names, from Dionysius to Chandragupta, and the duration of every one of their reigns, together amounting to 6,451 years, which would place the reign of Dionysius nearly 7,000 years B.C., and consequently 1,000 years before the oldest king found on the Egyptian tables of Manetho, who reigned 5,867 years B.C., and 2,000 years before Soufi, the founder of the Gizeh Pyramid.

Their Civilization and Emigration.—Opinion may be divided as to the site of the original home of the Aryas. But careful research into the Vedic literature shows that to the North-western Provinces of India to the countries bordering on the mouth of the Indus should be located the cradle of the Hindu civilization. It is there, between the rich land watered by the Five Rivers on the west and the Ganges on the east, that the Hindus made their earliest home, and shut in by the gigantic mountain barriers of the north, and endowed by Nature with a fertile soil, a keen intellect, a sublime mind, and rich with spiritual gifts, they had peace for centuries to develop a unique civilization, a mighty empire, and to found great states and powerful monarchies and kingdoms. For instance, the kingdom of Ayodhya (1500 to 2000 B.C.) prospered for 1,500 years. Kings of Magadha were Lords Paramount and Emperors of India for about 2,000 years, and their country the seat of learning, civilization, and trade. Ever since the Vedic period emigrations from Ancient India, both on a large and small scale, had been constantly going on from political, religious, commercial, and economic reasons, more perhaps after times of war than in seasons of peace

Egypt was one of the oldest colonies of Ancient India. The Hindu colonization of Persia seems to have taken place before the great war of Mahabharata. "Not only the language of Greece, but her philosophy, her religion, her subtle turn of intellect, her rivers and mountains, and above all the mysteries of that noble land, irresistibly prove her colonization from India." Thus, as Count Bjornstjerna says, "the civilization of the Hindus gradually extended itself in the west to Ethiopia, to Egypt, and to Phœnicia; in the east to Siam, to China, and to Japan; in the south to Ceylon, to Java, and to Sumatra; in the north, to Persia, to Caldaea, and to Colchis, whence it came to Greece and to Rome, and at length to the remote abode of the Hyperboreans."

Their Commerce and Science.—Their commerce was as extensive as their emigration. From ancient times commercial relations existed between North-west India, Malabar and Ceylon, and Egypt, Arabia, Persia, Babylonia, Assyria, Palestine, and Greece. The Hindus built ships, navigated the sea, undertook long sea voyages to dispose of their merchandise. From times of great antiquity India exported spices and aromatics, perfumes and precious stones. Her gold and silver brocades, her shawls and muslins, her cotton and silk, her purple and embroidered work, her pearls and rubies, her diamonds and gold, were some of the rich merchandise she exported viâ Alexandria, the great emporium of the East, to Egypt, Persia, Greece, Rome, and other parts of the world. As religion profoundly influenced the daily life and thought of the Hindus, they cultivated those sciences earliest that most helped them in their worship. Hence their sciences of astronomy, geometry, and practical anatomy, are very old. Even European scholars like Cassini, Bailly, Gentil, and Playfair maintain that there are Hindu observations extant which must have been more than 3,000 years B.C., and which evinced even then a very high degree of astronomical science. Of all the ancient nations, the Hindus alone had well-nigh accurately determined the rate of motion of the precession of the Equinoxes. The great antiquity of astronomy is the best proof of its originality. In the twelfth century A.D., Bhaskara expounded the law of gravity and the principle of Differential Calculus, thus anticipating Newton by many centuries. The geometrical theorem of the forty-seventh proposition, Book I, which tradition ascribes to Pythagoras, was solved by the Hindus at least two centuries earlier. Besides geometry, the Hindus invented trigonometry, algebra, the numerical figures (1 to 9) of arithmetic, the decimal system, and the game of chess, now used all over the world. The fables of animals from the time of Æsop downwards had their original home in India. The book of Sindebad is of Indian origin. "The Thousand and One Nights" is a Hindu original translated into Persian and thence into other languages. The tales of Panchatantra (five stories) were taken from the fables of Bidpai, the Indian sage, and translated from Sanskrit into Persian, Arabic, Greek, Hebrew, and other European languages, and have become the nursery stories for the amusement and instruction of the children of the whole world.

Alphabetical writing was known to India from the earliest times. Bjornstjerna says that the Hindu possessed written books of religion before 2800 B.C., or 800 years before Abraham. Cotton paper was used in India before the Christian era. They invented a language of unrivalled richness, harmony, and inflection—Sanskrit—which is the mother of all European languages. The Hindus were a nation of philosophers. The evolution theory of Kapilla, the atomic theory or Kanada, their theory of propagation of sound, of ether in space, their knowledge that light and heat are only different forms of the same essential substance, had been thought out centuries before the Christian Era. Brahmin philosophers, in their sublime faith in the unity of God, in the creation of the world, in the immortality of the soul, in the goodness of God, in the responsibility of man, rose far above the ancient Greek, Roman, and Jewish teachers and philosophers.

(II)

HINDU MEDICINE.

The medical system of the Hindus is as old as their civilization, and has lent materials for laying the foundation in other countries. No ancient nation can trace its healing art from prehistoric times, or present such a continuous though not a complete record of development for so many centuries. From the Vedic period, which we can safely put down as 4000 to 2500 B.C., we can trace the rudiments of medicine rising in two or three tiny streams from the slopes of the Himalayas. (*a*) The early hymns of the Rig Veda make mention of medicinal plants and herbs, and the hygienic properties of water, air and vegetables. (*b*) The juice of the Soma plant is praised as the amrita (ambrosia), and medicine for a sick man, and gold and lead are spoken of as the elixir of life. (*c*) Brahma, the chief of the godhead, seeing the suffering of mankind, hands down the Ayur Veda (the science of life) to Surya the sun god, who, like Phœbus, or Apollo of the Greeks, was regarded as the fountain of medical knowledge. The twin sons of Surya (the Ashwins) become the medical attendants of the gods, and attend as surgeons in the wars between the gods and the demons, cure wounds and surgical accidents, and teach Indra (the rain god) the Ayur Veda. These tiny streams were the beginnings of materia medica, chemistry and surgery, and uniting went to form the nucleus of Hindu medicine in course of time. In the next stage of the Vedic period we descend from the cloudland of mythology to the early dawn of Hindu medicine, and find two distinguished pupils of Indra, Dhanvantari and Atreya. Dhanvantari, the divine physician, was the father of Hindu medicine as Æsculapius was among the Greeks, and is said to have brought the cup of amrita, the drink of immortality, and taught Susruta the science of surgery. Atreya taught his pupils on the slopes of the Himalayas, and wrote several works, of which Atreya Samhita stands foremost. All his pupils became famous, and each distinguished himself by writing a medical treatise, of whom may be mentioned Agnivesha, who wrote a book on ophthalmology, and another on nidananjana, a well-known book on the diagnosis of disease; and Harita who compiled Harita Samhita, a standard treatise on medicine, containing, among other things, a description of the blood and its circulation.

Ayur Veda is the most ancient system of Hindu medicine and can now only be seen in fragments. Sir William Jones, writing about it, says: "I have myself met with fragments of that primeval work, and in the Veda itself I found, with astonishment, an entire upanishad on the internal parts of the body with an examination of the nerves and arteries, a description of the heart, spleen, and liver, and various disquisitions on the formation and growth of the fœtus." Atreya Samhita is the oldest existing work on Hindu medicine, written by Atreya for the use of his pupils and containing 46,500 verses in all.

About the close of the Vedic period the Hindus attained a high degree of civilization, and cultivated medicine, surgery, materia medica, and chemistry. The surgeons accompanied kings to the battlefield, where they used surgical instruments, extracted foreign bodies, and dressed the wounds and applied bandages. The healing art was no longer confined to Brahmin priests, but a class of laymen called vaidyas came into existence, who specialized in medicine or surgery. Humoral pathology must have been known to the Hindus as early as this, as we find the three humours of the body mentioned in the Rig Veda (I, 34, 6).

The Epic Period (2500 to 1400 B.C.).—During the early part of this period the Hindu civilization continued to shine in all its splendour and glory. It was the time depicted in the two great epic poems, the Ramayana and the Mahabarata. There was a physician attached to every court whose duty it was to look after the health of the king. The surgeons undertook major operations, both on the battlefield and in private practice. Schools of philosophy were opened where students were taught medicine and surgery. Dissection and vivisection were practised; and chemistry was brought into practical use by the development of chemical arts, such as bleaching, dyeing, calico printing, tanning, soap and glass making, &c. The Hindu medicine flourished in all its branches. New drugs were added to the pharmacopœia by physicians who went out with their pupils to gather herbs and study their properties. Classical authors, such as Charaka, Susruta, make their appearance, whose works became the groundwork of succeeding Hindu writers for many centuries.

Pre-Buddhist Period (1400 to 500 B.C.).—This was the age of Hindu sutras and philosophic systems which later on attracted the illustrious men of Greece, such as Pythagoras, who visited the surmans of India, and took back with them Hindu philosophy and medicine, which they embodied in their schools and writings.

Buddhist Period (500 B.C. to 600 A.D.).—Buddha, by prohibiting animal sacrifices and the dissection of dead animals gave a death-blow to surgery, but medicine flourished. After Buddha's death, the pilgrims who came from all parts to visit the land of his birth returned with manuscripts of Hindu literature and medicine and translated them into their own tongues. While in India itself Indian medicine received the greatest support from King Asoka—the Indian Constantine—and his followers. Medical houses or hospitals were established for both men and animals in the north and western parts of India, and were provided with all sorts of instruments and medicines, consisting of mineral and vegetable drugs. Buddhist monks in different monasteries studied philosophy and medicine and fortified their spiritual ministry by becoming skilful physicians and relieving the suffering of the people.

When Alexander invaded India he found on all sides signs of advanced civilization. And Taxilles tried to conciliate the general by promising to send "a goblet of ruby and a philosopher of great knowledge and a physician who has such skill that he can restore the dead." Arrian tells us that Alexander brought with him many clever Greek physicians who were unable to cure snake-bites and other ailments, while the Indian physicians treated these cases with success. The Greek general was so struck with the skill of these vytians (physicians) that he employed them in his camp and ordered his followers to consult them. Tradition says that at the end of his Indian campaign he took some of these learned vytians to Greece with him. These facts throw a sidelight on the state of Indian medicine, which must have been successfully carried on for centuries before it could have attained the advanced condition in which Alexander found it on his arrival in India in the fourth century B.C.

Arabian Period (600 to 1000 A.D.).—The Hindu medical works were greatly prized by the Arabians, whose intellectual activity was awakened after the death of Mahomed. Charaka, Susruta, and other Sanskrit literature were translated under the patronage of the caliphs, who made their court brilliant by gathering round them eminent men and philosophers of all nationalities, including Jews, Christains and Indians, and established a school at Bagdad, which attained a world-wide fame and influence. In the eighth century, and probably the ninth, Indians practised as physicians in Bagdad, and during the reign of Harun-al-Rashid they also lived at his court. Manka was a body physician to the caliph, cured him of a dangerous illness, and translated a work on poisons, by Charaka, into Persian.

The Arabian physicians who followed in the ninth and tenth centuries prescribed Indian drugs, and in their medical treatises made use of the Hindu authors and their works. For instance, Avicenna, in describing the treatment by leeches, begins by saying, "What the Indian says," and quotes the very words of Susruta in his description of six poisonous leeches. And what the Arabians learnt from the Hindu medical and scientific works they transmitted to the European physicians as late as the seventeenth century A.D.

The Mahomedan Period (1000 to 1500 A.D.).—The rise of the power of the Mahomedans at the heel of the Arabians marks the epoch of the sunset of Indian medicine, although even at the Mahomedan courts the vaidyans are reported to have cured many intractable diseases which had baffled the skill of their foreign rivals. While at the European period the Hindu medicine received its final death-blow.

(III)

DIFFERENT BRANCHES OF HINDU MEDICINE.

Now let us take a glance at the different branches of Hindu medicine.

Hygiene.—The Hindus paid great attention to hygiene, regimen of the body, and diet. The Hindu Shastras contain also a sanitary code:

and Manu, the great law-giver, was one of the greatest sanitary reformers the world has ever seen. The daily practice of early rising, of cleansing the teeth, anointing the body, bathing, exercise, shampooing, and rubbing the body became part of their religious duties. Two meals a day and food taken sparingly, so as to rise from meals with the stomach partly empty, rinsing the mouth before and after meals, chewing of pan which contains aromatics and spices to stimulate gastric juice and remove fœtor from the mouth, were part of their daily system containing sound physiology. They understood the sanitary properties of oil, which was used not only for the purposes of consecration but also for guests and strangers, and also for health and cleanliness. They have a saying that "As serpents never go near an eagle, so diseases do not approach a person who is in the habit of taking physical exercise and anointing his limbs with oil." Shampooing (massage) was practised from time immemorial by the Hindus. It is said to accelerate the mind, cure diseased phlegm, wind and fat; to diminish fatigue, increase internal heat, and bring on sleep. Both shampooing and anointing, used also by other ancient nations, such as Egyptians, Greeks, Romans, &c., were no doubt copied from the Hindus. Drinking and eating from the vessels of others, wearing shoes, clothes, or garlands used by others were considered a pollution, showing they had an idea of contamination so early in their period of history.

Chemistry.—In the Vedic period chemistry began as Rasayana, which was confined to fluid extracts and vegetable decoctions, and became merged into alchemy when the vegetable drugs were supplanted by mercury and metallic preparations. Though the Tantric cult and the worship of Siva (the third person of the Hindu Trinity) brought alchemy into prominence by identifying mercury with the elixir of life and philosopher's stone, chemistry made a gradual progress from the time of Charaka and Susruta. The ancient Hindus knew how to prepare sulphuric acid, nitric acid, and muriatic acid; the oxides of copper, iron, lead (of which they had both the red oxide and litharge), tin and zinc; the sulphuret of iron, copper, mercury, antimony and arsenic; sulphate of copper, zinc and iron, and carbonate of lead and iron. The fact that Susruta gives a description of making caustic alkali from the ashes of plants, the originality of which very much struck M. Barthelot, is a proof of the high degree of perfection the Hindus achieved in scientific pharmacy at so early an age. The preparation of ammonia, of alkalies and their salts, nitric, hydrochloric and sulphuric acids, though rudely simple, is of great antiquity. They understood the chemical processes of calcination, sublimation, distillation, and simple as was their apparatus, they distilled two of the most fragrant essences, the attar of rose and fragrant grass oil of Namur. The great metallurgist Patanjali (second century B.C.), in his treatise on metallurgy, gives elaborate directions for the preparation of metallic salts, alloys, amalgams, and the extraction, purification, and assaying of metals. Probably it was he who discovered the use of mixtures called Vidas, which contained aqua regia or other mineral acids in potentia. Though Charaka and Susruta mention mercury in their writings, Vagbhata mentions the use of mercury as a collyrium. Varahamihira (587 A.D.) gives mercury and iron among the aphrodisiacs and tonics. The metallurgist Nagarjuma (eighth century A.D.) advanced the knowledge of chemical compounds by his preparations of mercury. He was the first to introduce black sulphide of mercury. In the time of Vrinda (ninth century A.D.) and Chakrapani (tenth and eleventh centuries A.D.) the administration of mercury and its preparations was fully established, thus anticipating Paracelsus and his followers by several centuries. There can be no question as regards the priority of the Hindus in making mercury and its preparations a specialty, and administering them both externally and internally. In fact, among the ancients they were the only people who prescribed mercury internally, and the first to give mercury internally in syphilis. In the sixteenth century, when the Portuguese settled themselves in Goa and other parts of India, syphilis made its appearance. The Hindu physicians could not account for this disease, as all their medical writings from the time of Charaka and Susruta downwards were silent on the subject, while they gave accurate descriptions of other diseases of the genital organs. So they called it Phiranga Roga (Portuguese disease), and administered mercury in the form of calomel and by inunction. The term "Phiranga Roga" speaks volumes as to the origin of syphilis in India.

As for applied chemistry, Megasthenes says that Indians were early skilled in the arts. Among the chemical arts and manufactures which enabled India to command for more than one thousand years the markets of the East as well as of the West, there were three of the great Indian discoveries which secured to India an easy and universally recognized pre-eminence among the European nations of the world: (*a*) The preparation of fast dyes for textile fabrics; (*b*) the extraction of indigotin from the indigo plant; (*c*) the tempering of steel.

The art of dyeing was carried almost to perfection, the fast colours resembling the Tyrian purple. The blades of Damascus, so famous in

Persia and Arabia and all through the Middle Ages, were made of Indian steel, and manufactured in the workshops of Western India. The wrought iron pillar close to the Kutub, near Delhi, weighing 10 tons, and being 1,500 years old, the huge iron girders at Puri, the ornamental gates of Somnath, bear eloquent testimony to the marvellous metallurgical skill attained by the Hindus. Bleaching, dyeing, calico printing, tanning, soap and brass making, were some of the chemical arts known to the Hindus from high antiquity. They early attained perfection in copper and brass work, in gold and silver ornaments admired for delicacy and beauty, and in the weaving of cotton and muslin unrivalled for their softness of texture and exquisite fineness. Firearms of some kind were used in the early stage of Indian history: rockets (says Professor Wilson) appear to be of Indian invention. Varahamihira gives several preparations of cements, "strong as a thunderbolt," used in the temple architecture of the Buddhist period. The Vasavadatta and the Dasukumara Charita, in sixth century A.D., allude to the preparation of coagulated mercury; a chemical powder to bring deep sleep, a chemically prepared stick for producing light without fire, and a powder like curare which paralyses the sensory and motor organs.

Pathology.—According to the Hindus the body is composed of five elements—wind, fire, water, earth and ether—having their respective qualities of dryness, sharpness, fluidity, heaviness and lightness. The humours of the body—wind, bile, and phlegm—are formed from the elements. The harmonious action of the elements and their qualities constitute health. The humours prepare the various actions of the body. When the humours become either corrupt or deranged they cause disease or death. So that to reduce the humours where they are abundant and increase them where they are wanting, to get the right proportion of elements in their humours, form the basis of cure among the Indians. This object is accomplished, in the first place, by the management of diet, strict regimen, and temperate life. If these fail, the deranged humours should be expelled by emetics, purgatives and blood-letting. Therefore the Hindu physicians used to prescribe emetics once a fortnight, a purgative once a month, and blood-letting twice a year at the change of seasons. There are certain seasons when the corrupted humours of the body are ripe for being evacuated, and this period of maturation of deranged humours was called the critical stage—the "crisis" of Hippocrates, the idea of which exists even to the present day. So then, the diseases of the body are the diseases of the various humours. Medicine by increasing or decreasing the humours cures the diseases of the body, while the diseases of the mind are cured by reading the Shastras (scriptures), abstinence, leading a religious life, and various mortifications of the body. As the Hindu physicians saw that the blood was more generally affected by deranged humours causing disease, the derangement of blood as the fourth cause came to be added to the humoral theory, hence their enthusiasm in giving medicines, and local and general blood-letting to purify the blood. The fact that Hindu pathology was adopted by all the ancient nations and proved to be the basis of their medicine for many centuries shows that there must be a great deal of shrewd observation and common-sense underlying the principle. After all, Hindu pathology is not so absurd as it seems on the surface. The wind diseases of the ancients are diseases of the respiratory system, the diseases of bile correspond to the diseases of the circulatory system, while the derangements of phlegm come under the diseases of alimentary system. The humoral pathology, worked out at such an early period as the Rig Veda, shows that the Hindus were the teachers, not the learners from other nations.

The ancient Rishis of India went thoroughly into the diagnosis of a case, and were guided by the patient's appearance, eye, tongue, skin, pulse, voice, urine, and fæces. The examination of the pulse was considered the most important of all, and for this purpose the radial artery at the wrist was chosen. It is most striking to note the similarity of the description of the pulse as found in the ancient Sanskrit treatises and the doctrine of the theory of the pulse as taught by Galen, who had evidently derived his knowledge from the works of the ancient Indian physicians. They treated leprosy successfully; their cures of snake-bites astonished Alexander and the Greek physicians who accompanied him. Their attention to diet, fasting and temperate life cut short many a disease in its infancy. They treated almost every ailment by first prescribing purgatives; and intermittent fevers by arsenic, skin eruptions by arsenic and mercury. Their ideas and treatment of consumption seem very modern. They attributed the cause of consumption to excessive grief, great fatigue, a diminution of mental and bodily strength, violent exercise, excessive venery, and treated it with animal food, ghee (clarified butter) of goats and sheep, with barley, prepared barley, flour and rice with animal broths, a mixture of ghee, honey and pepper, garlic, fumes of turpentine and pine, &c., and recommended the patient to live in the same room with goats. The treatment of many other diseases besides consumption is similar to that of the West.

Anatomy.—The Hindus were the first to practise the dissection of the human body. Both Charaka and Susruta insist that the knowledge of practical anatomy is essential to be a practitioner. The body to be dissected was first washed, placed in still water in a moving stream for seven days and then taken out and each layer examined before being removed, beginning with the skin. Charaka gives 306 bones and Susruta 300 in the human body (the difference is in the counting of the cartilage with the bones), 500 muscles, of which 400 are in the extremities and the remainder in the trunk and head, 107 articulations, 210 joints, 68 movable and 142 immovable, 8 forms of joints, 900 ligaments, of which 600 are in the extremities, 230 in the trunk and 70 in the neck and head. The Hindus believed that from the navel all the blood-vessels proceed and that it is the principal seat of life (prana). Susruta enumerates 40 principal vessels with 700 branches; 10 contain wind (hence artery means carrier of air), 10 bile, 10 phlegm, and 10 blood. Blood nourishes all the other essential parts of the body.

Digestion and Circulation.—The Hindus held that the food we eat goes down by the action of bi-motor force (prana vayu) into the gullet and stomach, where it becomes mixed up first with gelatinous mucus, which has a saccharine taste, and then acidulated by the further action of digestive juice (evidently gastric juice), and goes down the pitta sayu (duodenum), into which bile comes down from the liver, and then into the small intestine. There the bile acts on the chyme and converts it into chyle. The essence of chyle from the small intestine is driven by the bi-motor force (prana vayu) along with the dhamni trunk (the thoracic duct) first to the heart and then to the liver, where the colouring matter in the bile acts on the essence of chyle and imparts to it a red pigment, transforming it into blood. The circulation of the blood is distinctly understood by Charaka, Susruta, Dalvana, Bhanumati, &c., as we read that "the heart which receives and then sends down the chyle through the dhamanies and gets it back transformed into blood." To them the circulation of the chyle was really identical with the circulation of the blood, as they argued that chyle or rasa is blood without the colouring ingredient. Harita, who is older than Susruta, in describing anæmia as caused by swallowing clay, says, "The clay thus eaten blocks the lumen of the several veins and stops the circulation of the blood." Bhavamisra, who was centuries older than Harvey, quotes another author thus: "Blood by circulating through its vessels fills the dhatus well, causes perception, and performs other functions (of nourishing and strengthening)."

Surgery forms the first chapter in the Ayur Vada, and Susruta says that "it (surgery) was the first and best of the medical sciences; less liable than any others to the fallacy and conjectural and inferential practice, pure in itself, perpetual in its applicability, the worthy place of heaven, and certain source of fame." The ancient Hindu practitioners were bold and expert surgeons and performed cystotomy, lithotomy, embryotomy, and couched for cataract. There were three modes adopted by the Hindus for treating surgical cases—by cutting instruments, by caustics, and by actual cautery. In the opinion of Susruta caustic is better than the knife and the cautery better than either. The earliest surgical works mention no fewer than 125 surgical instruments for ophthalmic, obstetric and other operations, which shows how carefully they studied surgery. They set fractures and dislocations in men and beasts, reduced hernia, cured piles and fistula-in-ano, and extracted foreign bodies. They performed amputations and abdominal section. They were experts in rhinoplastic operations, which were practised for ages in India. As Dr. Hirschberg says: "The whole plastic surgery in Europe had taken its new flight when these cunning devices of Indian workmen became known to us. The transplanting of sensible skin flaps is also an entirely Indian method." The Hindu teachers gave practical instruction on surgery to their pupils. The different surgical operations were shown to the students upon wax spread out upon a board, on gourds, cucumbers, and other soft fruits; tapping and puncturing was practised on a leather bag of water or of soft mud; scarification on the fresh hides of animals on which the hair was allowed to remain; venesection on the vessels of dead animals and on the stalks of water lilies; the art of probing and stuffing on bamboo, reed, and cavities of wood; suturing on pieces of cloth, skin or hide; ligatures and bandages on well-made models of human limbs; application of caustics and the actual cautery on pieces of flesh; catheterization on an unbaked earthern vessel filled with water; and the extraction of teeth upon dead bodies of animals. When operation was decided on, an auspicious day was selected, and a clean and well-lighted room was chosen, instruments arranged so as to be at hand when required, with bandages, lint, honey, ghee, hot and cold water, &c. The patient faced the east, the surgeon the west. Incense was kept burning in the operation room, thus foreshadowing the germ theory of the present day. In serious or painful operations the patient was made insensible by anæsthetics, lint smeared with honey or ghee placed upon the wound and bandages applied to the part. The dread of hæmorrhage did not deter the Hindu surgeons from amputating a limb under urgent circumstances. In these cases boiling oil was applied to the stump; with pressure by means of a cup-formed bandage to arrest the bleeding; pitch also appears to have been added to assist in stopping the blood.

To give an instance of their cleverness in brain surgery, King Bhoga of Dhar (977 A.D.) was suffering from a severe pain in the head which baffled all medical treatment. While his condition became critical it so happened that two brother physicians arrived in Dhar at that time, who after careful examination considered an operation was necessary. Accordingly under the influence of an anæsthetic (Samohini) they trephined the skull, removed from the brain the real cause of the complaint, closed the opening, stitched the wound and applied a healing balm. The royal patient got completely well.

The art of surgery began to be neglected after the death of Buddha, and medicine after the Mahomedan invasion, and both declined after the European conquest of India. But by that time Hindu medicine had accomplished its task, and though practically dead, it lives in the younger civilizations of other nations and other countries. As in other branches of science, Hindu medicine was permeated with the spirit of philosophy and religion. To the Hindus Brahma was the first physician, and atma (soul) was of supreme importance. They reasoned from mind to matter, and treated man as a whole, body, mind and spirit; hence the Brahmins combined the offices of physician, philosopher and priest. Their love of philosophy and metaphysical speculations often clouded their rational conclusions; but their keen observation of Nature and by the bedside of the patients made them great in diagnosis and treatment. Their fertile imagination soared so high that it often outran reason; but they prescribed a strict regimen, a simple life and mental rest to their patients; while they directed them to the source of all peace—the basis of all cure and the want of which the cause of all disease. If the West had a little more of the spirit of philosophy and faith of the East, it would have saved her many a disappointment and many a false conclusion with which her path of research is so thickly strewn. It would give her a wider outlook, a larger vision, so that she could look beyond the material and physical bases of life to those hidden forces and agencies for the cause and treatment of disease.

The Hospital and Chapel of Saint Mary Roncevall at Charing Cross.

By JAMES GALLOWAY, M.D.

> "En Rencesvals si est Carles entrez ;
> * * * *
> Rollanz remeint pur les altres guarder.
> * * * *
> Halt sunt li pui e tenebrus e grant,
> Li val parfunt e les ewes curranz.
> * * * *
> Li gentilz quens, qu'il fut morz cunquerant."
> —"La Chanson de Roland," édition, Léon Gautier.

THE fact that the conventual Hospital of St. Mary Roncevall was founded at the village of Charing in the time of Henry III, and that it continued to exist till the dissolution of the religious houses by Henry VIII, is well known to students of the history of London ; but, so far as the writer is aware, no definite attempt had been made to collect the remaining records of this interesting medical foundation before 1907, when the story of the Convent and its Hospital was published privately.[1] Nevertheless, the influence of the Convent and the Hospital which it established was considerable during the three centuries of their existence in England. The name which the Convent in London received from the Mother House served to revive the memories of perilous journeys and of timely succour in the minds of many who had travelled abroad in France and Spain, engaged either in warlike or peaceful affairs, the name of Roncevall in many forms came to be used as a family designation in various parts of England,[2] and Chaucer refers to the existence of the Convent in a way that shows that the reference required no explanation to his readers.

After the dissolution of the alien priories the fraternity owed its continued existence to the recognition of the charitable assistance it rendered to "the poor people flocking to the Hospital." This attempt, therefore, to fill up a gap in the history of the London hospitals may be of some interest to the Historical Section of the Royal Society of Medicine.

---

[1] Galloway, James, "The Story of Saint Mary Roncevall," private publication ; and *Charing Cross Hosp. Gaz.*, 1907, ix. p. 43. Cf. references by Dugdale, "Monasticon Anglicanum," ed. 1830 ; Newcourt, "Repertorium Ecclesiasticum Parochiale Londinense," 1708 ; Tanner, "Notitia Monastica," 1744 ; also by Stow and later writers on London.

[2] The records of the painful dispute between the Abbot of Rewley and John Ronceval and his associates, John, Thomas, and Walter Rounceval may be yet read with interest. Calend. Pat. Rolls. 16 Ed. II and 14 Ed. III. (1323-41.)

RONCESVALLES.

There are few places so renowned in the early literature of the Romance languages as the pass through the Western Pyrenees, at the southern extremity of which lies the village of Roncesvalles. The Song of Roland handed down the memories of Roncesvalles from the early Middle Ages; but this famous poem (dating in its present form from the latter part of the eleventh century) must be regarded only as the final and successful effort to collect the traditions which form the foundations of French and Spanish history. The traditions find their earliest record in the legends and "chansons de geste," which, in the first instance, served to commemorate the successful rising of the people of Spain to expel an invader, Charlemagne, the Emperor of the North. The rearguard of his retreating host, consisting chiefly of Frankish subjects of the Emperor under the leadership of the Count Roland, Captain-General of the Breton March, the Emperor's nephew, was overwhelmed and annihilated, while traversing the Pass on their retreat from Spain in the year 778. The ancient history of Eginhard, telling of the Spaniards, says very suggestively "usque ad unum omnes interficiunt ac . . . summa cum celeritate in diversa disperguntur." Even "li gentilz quens" did not escape the massacre. The Chanson de Roland gives the French version of this tradition, which was accepted by the Normans in England: the Spanish legend of the hero Bernardo del Carpio gives, as it is to be expected, a very different account of the overthrow of the Emperor.

In the course of the succeeding centuries the Pass of Roncesvalles occupies on more than one occasion a prominent place in British history. One of the most picturesque passages in Froissart tells how the army of Edward the Black Prince traversed the Pass in the ill-omened invasion of Spain that led to his fatal illness. His remarkable victory at Navarrete scarcely relieves the gloomy record of this adventure. Little more than one hundred years have elapsed since Roncesvalles and the neighbouring defiles once more saw the advance of war-worn British soldiery. In the defence of these passes against the advance of the French under Soult, so nearly successful in overwhelming Wellington's right flank, and in the subsequent pursuit of

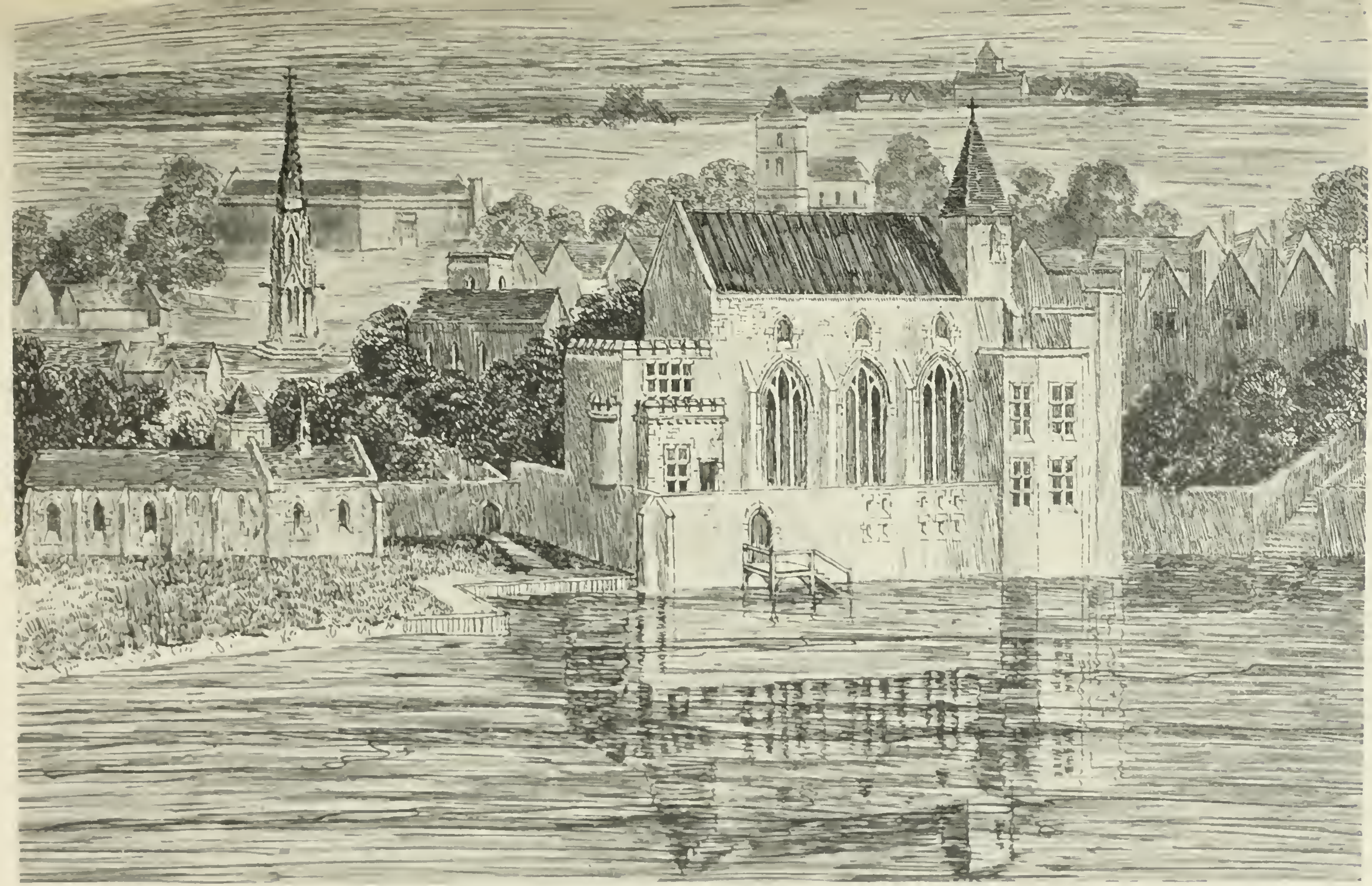


Fig. 1.

Charing Cross and the Chapel of St. Mary Roncevall in the early part of the sixteenth century. (After Van den Wyngaerde, and from other sources of information.)

the retreating French armies, some of the most remarkable of the feats of arms which distinguished the Peninsular War took place. British military history contains few more stirring episodes than the combats between the French and the allied troops in the Passes of Maya and Roncesvalles.

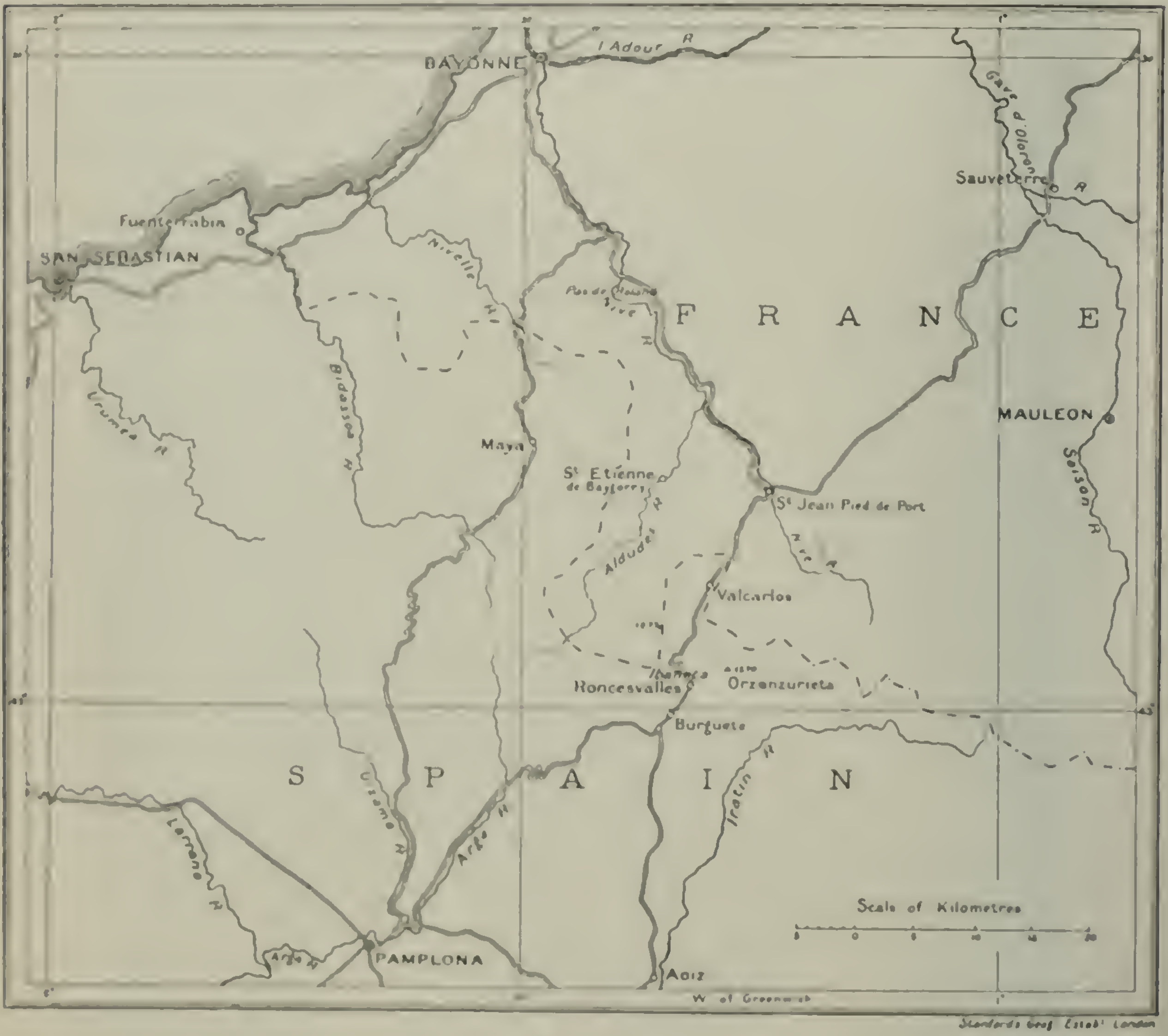


Fig. 2.

A chart of the Western Pyrenees, showing the roads through the passes and the position of Roncesvalles and Ibañeta.

The memories of Roncesvalles, therefore, are in no danger of being forgotten, but it has passed from knowledge that for a period of more than three hundred years the name of Roncesvalles was more familiar to the citizens of Westminster and London than to the dwellers in Pamplona and Bayonne. How it came about that an important religious house dedicated to Our Lady of Roncesvalles should have been established at Charing will best be understood if we consider the nature of the activities of the ancient Monastery in the Pass of Roncesvalles, the numbers of those on whom it conferred benefits, and the character of its benefactors in England.

THE CONVENT OF ST. MARY RONCESVALLES IN NAVARRE.

From very early Christian times a religious house, no doubt very small in its beginnings, was situated near the top of the pass through which runs the ancient road over the Pyrenees leading from Pamplona in Navarre, through the mountains by St. Jean Pied-de-Port, to Bayonne and Bordeaux. The religious community at this place received its most important support from Charlemagne himself, when he established a religious house intended to be a memorial of Roland and his comrades in arms. The original Convent of Charlemagne's foundation was situated close to the village of Ibañeta, near the summit of the Pass and the site of the great battle. Of this house only insignificant and deserted ruins remain. After a destructive raid by the Moors under Abderramen, Caliph of Cordova, in 921, the community removed to the present site of the Monastery in the village of Roncesvalles, two or three kilometres farther south. The removal of the Convent to this site is said to have been determined by various miraculous signs, among others by the discovery of an image of the Holy Virgin, and it was clearly to the advantage of the community that its permanent settlement should be in the comparatively sheltered southern approaches of the Pass rather than on the exposed summit.

The Order of Roncesvalles thus became established on a firmer basis, and at first had distinct military as well as religious purposes. The members of the community consisted of knights and companions, as well as the brothers and sisters, who all bore the badge of the Order. The duties which they had to fulfil were military, for the Knights of Roncesvalles were in frequent conflict with the Moors, and religious, for not only did the brethren serve their Church, but one of the earliest and most important duties of the community was to establish a hospital in the Pass for wayfarers in this wild region.

In the course of time the members of this military-religious community received the Augustinian Rule, but they retained much of their independence, the memories of their original order, and especially held to the traditions of hospitality and charitable succour to pilgrims and to those in distress. The Convent and its Hospital gradually acquired wide renown on account of the good works carried on by the Canons. Their house was on the main road between France and Spain. The military expeditions so frequently traversing the frontiers marched along the highway passing its doors, pilgrims visiting the shrine of St. James at Compostella must have halted there on their way to and from the south, and the road through the Pass was the chief highway for peaceful travellers of every kind. The community, therefore, increased in importance and in wealth by gifts from princes, nobles, knights, and the common folk, and came to possess property not only in Spain, but also in Portugal, Italy and in France, and, as the records show, in England and Wales, in Ireland, and in Scotland. It is stated that at the height of its prosperity the Convent distributed annually from 25,000 to 30,000 rations, each consisting of a loaf of 16 oz., half a pint of wine, with sufficient soup and meat, or fish on days of fast. Those who were infirm had chicken broth and mutton. The Hospital had a staff consisting of the physicians, with whom were associated surgeons and an apothecary, and one of the distinguishing features of the Order at a very early period was that it included sisters. In the case of patients dying while in hospital, free interment was given after the celebration of masses in due form. It is expressly stated that the daughter house in England, with its possessions in that country, in Ireland, and in Scotland, remitted annually the sum of 4,000 ducats for the support of the Mother House at Roncesvalles.

During the fifteenth and sixteenth centuries the community of Roncesvalles fell on evil days. The march of events deprived them of their property abroad, while laxity in the observance of their Rule and the continually disturbed state of the Franco-Spanish frontier brought about the loss of the greater part of their accumulated possessions and wealth.[1] Unfortunately the ancient records of the Monastery have nearly all been destroyed; but there remains in the library an unpublished manuscript giving the history of the Order and the Convent, written by Don Juan Huarte, about the middle of the seventeenth century, which incorporates information received from a certain Don Francisco Olastro[2] (who is stated to have been an ambassador from England in Madrid) respecting the history of their daughter house in London. But even at the time when this document was written, many statements it contains appear to have acquired the characteristics of tradition and can be accepted only after careful collation and criticism. We have, therefore, to depend almost entirely on the English records or the history of the House of Roncesvalles in London.

---

[1] Cf. Reseña histórica de la Real Casa de nuestra Señora de Roncesvalles; por D. Hilario Sarasa, Pamplona, 1878; a review was published by Wentworth Webster in the "Academy," 1879, xvi, p. 135-6.

[2] ? Francis Oliver.

THE CONVENT OF SAINT MARY RONCEVALL AT CHARING.

To understand how it was possible that a religious house in the Pyrenees could hold possessions scattered throughout so many different lands, it must be clearly borne in mind that in the Middle Ages the rule exercised by the Church took very little cognizance of State limits. The ecclesiastical power was much stronger than the national influences of the time, and the Church drew its revenues from all Christian countries, quite irrespective of political boundaries. At the time when the House of Roncesvalles at Charing was founded, the overlordship of the Pope had been felt in England and in France in a very real manner. In addition to this ecclesiastical bond, the political relationships between England, France and Northern Spain were of the most intimate character, so that the all-pervading power of the Church could be exercised with the greater ease in these countries. During the period of the Norman, and even more so during the Angevin dynasty, the English barons experienced the greatest difficulty in detaching themselves from the influences exerted on them by their foreign relationships, even if they had the desire to do so. In many cases they seem to have frankly regarded their insular possessions as sources of revenue and power to be made use of in order to promote their Continental interests. In this respect they followed the example set in such unmistakable fashion by kings such as Richard and John. The Church acted in the same manner, and many foreign convents were able, by their powerful influence, to obtain possession of, and to exploit, the rich lands of England for their own support. It was not until the close of the reign of John and during the reign of Henry III that the separate destinies of England and France became apparent to the more sagacious of the English statesmen of that period. It is very instructive, therefore, to note as evidence of the complicated and distracting political and social influences still felt by the English magnates, that the noble family which perhaps most of all by its example and advice sought to uphold the political independence of England as apart from France, was nevertheless impelled to become one of the great benefactors of a foreign religious house.

WILLIAM MARSHALL, EARL OF PEMBROKE (1219-31), FOUNDER OF ST. MARY RONCEVALL.

The House of Roncesvalles appears to have owed most of its property in England and in Ireland to the liberality of William Marshall, Earl of Pembroke, the eldest son of the great William Marshall—*Rector regis et regni*—the Protector of the King and his kingdom after the death of John. The elder Marshall stands out in conspicuous fashion as the most steadfast of all the advisers of the king during the dark period coinciding with the reigns of Richard I and John. His early years were passed in France, acquiring skill in the martial exercises commonly practised by the young nobles of the day, and his courage and proficiency in arms were such that he had early acquired the reputation of being one of the most redoubtable knights in Christendom. If no other evidence remained of his prowess, the historic passage of arms against Richard Cœur de Lion while still Count of Poitiers will be sufficient proof.[1] On this occasion he overthrew Richard and held him at his mercy, preventing the mad attack on his father, and probably saved the Prince from the fate of being a parricide. In addition to his skill in the use of arms, he gradually built up for himself a reputation for prudence, sagacity and loyalty, so that while still a young man he was entrusted with the guardianship of the young Henry, son of Henry II, and in the succeeding reigns occupied the most prominent positions under the English Crown, trusted by the barons and even by John. The testimony of the French King Philip Augustus, when informed of the death of William Marshall, as to his reputation for loyalty and honour remains on record: "Et, en vérité le Maréchal fut l'homme le plus loyal que j'aie jamais connu."[1]

---

[1] "Al conte Richard ki veneit.
E quant li quens le vit venir
Si s'escria par grant hair:
'Par les gambes Dieu! Marechal
Ne m'ociez, ce sereit mal.
Ge sui toz desarmes issi.'
Et li Marechal respondi:
'Nenil! diables vos ocie!
Car jo ne vos ocirai mie.'"

"L'Histoire de Guillaume le Marechal," 8836-8844; publie pour la Societe de l'Histoire de France par Paul Meyer.

During the many years of William Marshall's residence abroad he travelled widely throughout France and no doubt in Northern Spain. It is well known that he went on pilgrimage to the Holy Sepulchre in fulfilment of a promise given to the young Henry on his deathbed. Marshall must have been very familar with the reputation of the Monastery at Roncesvalles. There can be little doubt that he had passed it on his journeyings; the military-religious character of its Rule would have appealed to him, and he may even have rested in the House of the Convent. His piety is evidenced by the fact that he became closely associated with the Order of the Knights Templars, was one of their great benefactors in England, and at his death received sepulture in their church, then newly built in London.

The elder Marshall died in the year 1219, and was succeeded by his eldest son, also called William, who then became possessed of one of the most extensive heritages in England, for the English and Welsh lands of the Clares, Earls of Pembroke, and in addition their great Irish inheritance in Leinster, had come into the possession of the Marshall family.

What we know of the son shows him to have been a man of much the same type as his father—probably not so rugged, but with the same steadfast ideals of loyal conduct. It is evident that his character was as strongly tinctured with religious feeling as was that of his father. He also was an Associate of the Order of the Knights Templars, and was one of their principal supporters after their removal to the "New Temple," where the "Temple" Church still stands. His admiration for his father is clearly shown by the priceless biography of the elder William which we still possess. This poem is known as "L'Histoire de Guillaume le Maréchal" and is evidently the work of a professional writer of the period, but it was composed under the direction of the son of the great Marshall with the assistance of Jean d'Erleé,[2] his father's old companion and faithful squire.

---

[1] "Dist li reis 'mes li Maréchal
Fu, al mien dit, li plus leials,
Veir, que jeo unques coneusse
En nul liu ou je unques fusse."
—"L'Histoire de Guillaume le Maréchal," 19119-19152.

[2] Erlée; Earley (Erleia, Erlegh, &c.), near Reading.

During the lifetime of William Marshall and his son, and for long before and after, the high road through the Pass of Roncesvalles was much frequented. It was the main line of communication by land between France and Spain on the western frontier, and was used both by peaceful travellers and by the numerous military expeditions passing from one country to the other. These expeditions resulted not only from the constant warfare of the border but were also organized by Crusaders on their way to help the Spaniard

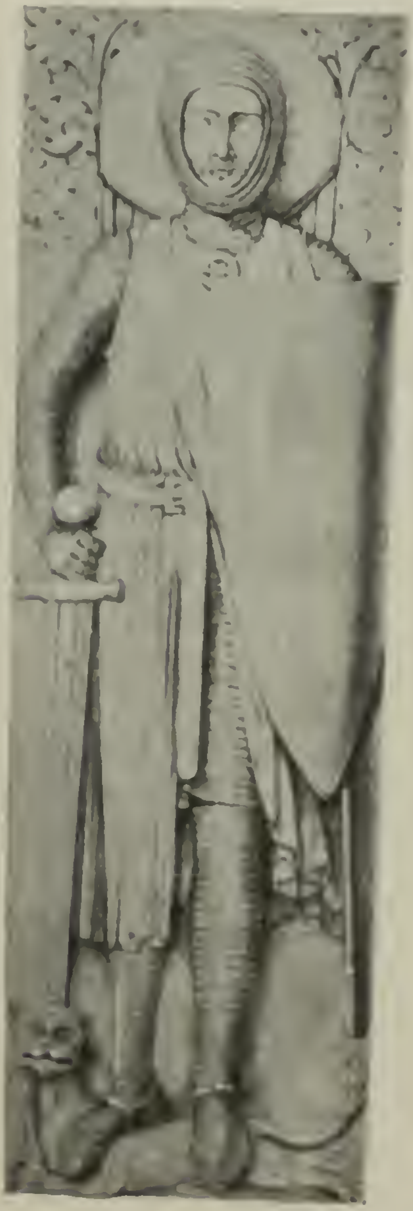


Fig. 3.

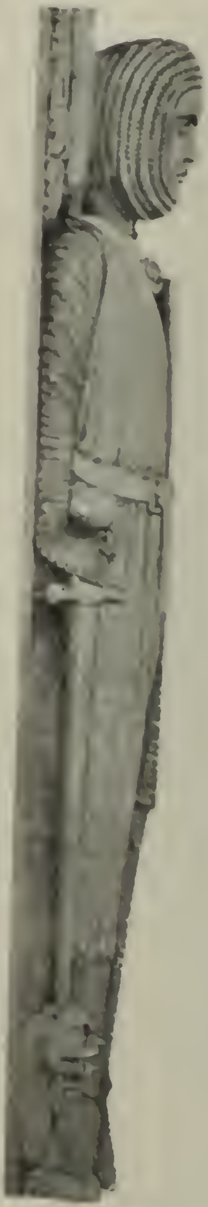


Fig. 4.

Figs. 3 and 4.—Front and profile views of the effigy in the Temple Church of William Marshall, sen., Earl of Pembroke (*ob.* 1219).

against the Moor, frequently with the purpose of travelling farther to the Holy Land. At this time also the relationships formed by Henry II and his sons with the Courts of the new kingdoms in the north of Spain, which were beginning to arise as the tide of Moorish invasion receded, were of the most intimate character. It will be remembered that Richard, when King of England, married Berengaria, daughter of Sancho VI of Navarre, after a very troublesome

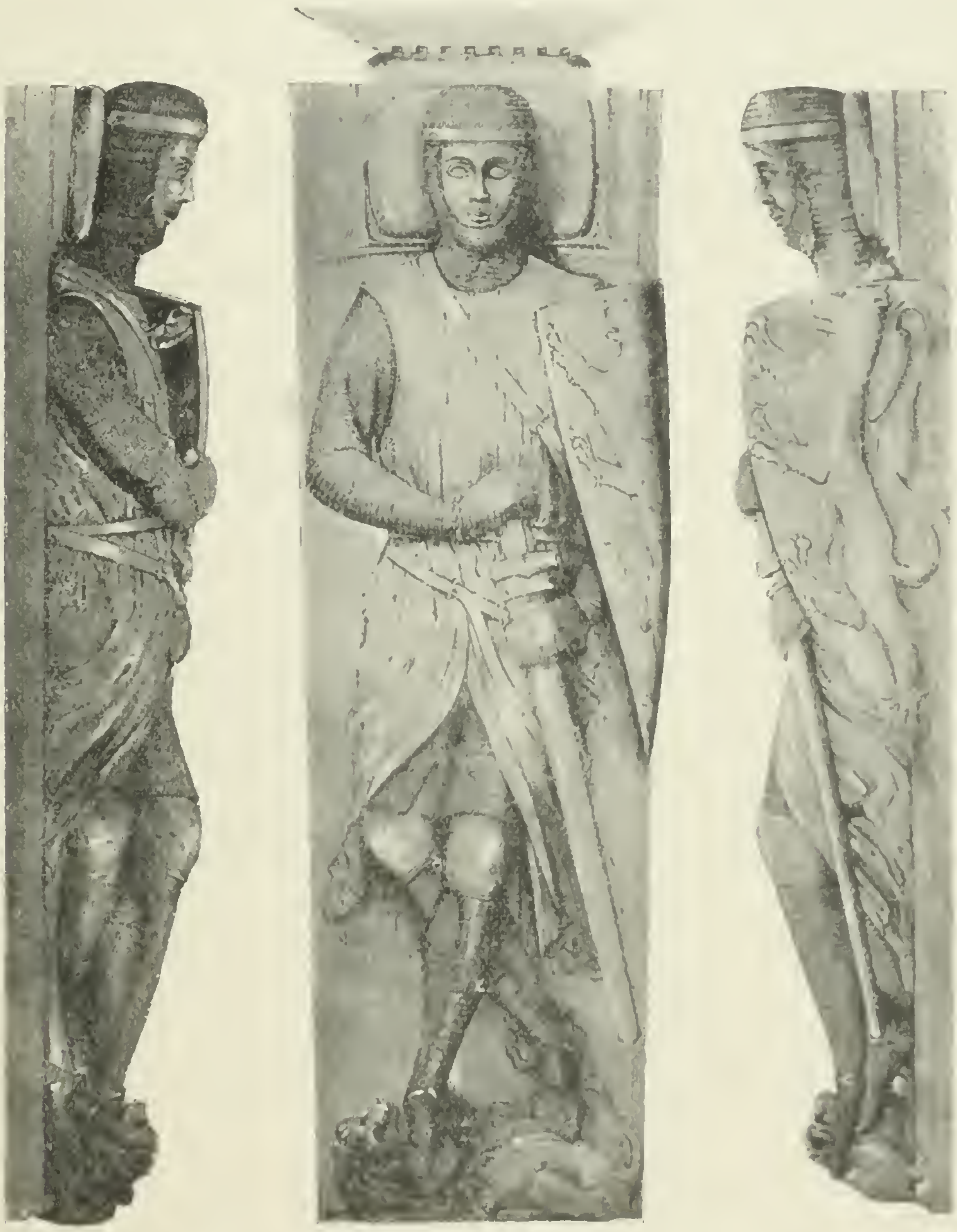


FIG. 5. FIG. 6. FIG. 7.

Figs. 5, 6, and 7.—Front and profile views of the effigy in the Temple Church of William Marshall, jun., Earl of Pembroke (*ob.* 1231).

wooing, and that the younger Sancho took the part of Richard while the latter was on crusade against their common enemies in the South of France. The relationship between the Courts of Aragon and Castile and the Angevin Kings was no less intimate. William Marshall and his eldest son were in the closest association with the Royal House. They both travelled far and wide over France and Northern Spain, so that the Angevin dominions in Aquitaine and the neighbouring kingdom of Navarre must at one time have been as well known to the Marshall family as their home in England.

Another reason which brought many travellers along the road through Roncesvalles was the attraction of the Shrine of St. James at Compostella. The pilgrimage to Compostella was undertaken by knights and their squires as the result of vows made on the field of battle, and was famed for its efficacy among all engaged in military affairs. But the pilgrimage even to armed bands was a dangerous one on account of the disturbed state of the frontier. An interesting example of this is presented in the relationships between Richard and his neighbour the Count of Toulouse. The ostensible cause for Richard's warfare against the Count of Toulouse was the inveterate inclination of the latter to acts of brigandage. When war was declared the Count of Toulouse had actually captured and ill-treated two English knights named Robert le Poer and Ralph Fraser, on their return from a pilgrimage to Compostella. The reputation of the Hospital of St. Mary in the Pass of Roncesvalles and of the Convent which supported the Hospital was known to every traveller—peaceful or warlike—in Western Europe, and would certainly have appealed to the benevolence of such a man as the younger William Marshall. The probability is that both father and son had stronger motives for giving alms to the Community—the result of benefits received from the Convent and Hospital during their journeys between France and Spain.

THE COMING OF THE BRETHREN TO ENGLAND (1229) AND THE FOUNDATION OF THE CONVENT AT CHARING.

The first knowledge we have of the presence in England of members of the Community of Roncesvalles is obtained from the letters of protection given to certain brethren by Henry III, in the year 1229. These letters were of the usual complete character, and it is clear that the intention of the deputation from Roncesvalles was to seek alms in

England for the support of their House in the remote valley in the Pyrenees. This purpose was definitely encouraged by a special clause in the letters of protection.

The brethren seem to have been taken under the patronage of the younger William Marshall from the beginning. They may even have come to England on his invitation, for we find that he soon commenced to make arrangements to give them revenues and an establishment in this country. Very unfortunately for the Convent, the Earl died in the year 1231, soon after his return to England from Henry's disastrous campaign in Poitou and Brittany, where he had held the chief command. But the record of his great gift remains, for on August 11, 1232, Henry confirmed at Wenlock "the grant to Saint Mary and the Hospital at Roncevaux (*Roscida Vallis*) of the gift which William Marshall, sometime Earl of Pembroke, made to them of all his houses at Cherring, and the houses and curtilages adjoining them formerly belonging to William Briwere, and of 100*s.* at Suthanton payable from the houses of the said Earl there, of 13*l.* of land in Netherwent in the moor of Magor, and of a carucate of land in Assandon, which he bought from Robert de Rochford."

It was thus in consequence of the munificence of William Marshall the younger that the brethren of Roncesvalles obtained the land on the banks of the Thames at Charing where they subsequently built their conventual dwelling, their Hospital for the sick, and the Chapel by the riverside, which were to remain an important feature of London for over three hundred years.

SAINT MARY RONCEVALL TO THE YEAR 1348.

The records of this alien settlement for many years consist mainly of statements of the gifts received from various important persons. The community seems to have flourished, and their work, both in London and in the Pyrenees, continued to deserve the sympathy and support of their pious benefactors. There is evidence that they possessed property in Norwich, Canterbury, Oxford, Pevensey, Southampton, and elsewhere, and that they received certain revenues from Ireland and from Scotland. It is easy to understand that their Irish revenues may have been considerable on account of the great estates possessed by the Marshall family in Leinster. It is clear also that the Convent had the advantage of royal favour and patronage, for the English records contain several confirmations of valuable gifts from both Henry III and Edward I.

derived from royal property situated in the South of France, to the mother house in the Pyrenees. One of the most interesting of these gifts is the rent to be derived for the benefit of the Convent from the King's lands in the town of Myramand, previously granted to Eleanor, the Queen Mother. This grant is specially mentioned in the same document as another endowment derived from the same source to be paid to the Abbey of Fontevraud. This benefaction to the House of Roncesvalles gives the measure of respect in which it was held, for an English king who placed the house of Roncesvalles in the same category as the Abbey of Fontevraud as worthy of support must have felt the claims of the Convent in the Pyrenees in the strongest possible way. Edward's Angevin ancestors had been buried in the Church of Fontevraud for generations, and there was no ecclesiastical foundation possessing a greater claim on the munificence of the Angevin family than this Abbey.

The little that is known of the domestic progress of the House at Charing, in addition to such general indications as are given of its financial condition, concerns the appointment of certain officials. In the year 1278, and again in 1280, a certain Henry, son of William of Smalebrook, was appointed as his attorney for two years on each occasion by the Prior of the Hospital of Roncesvalles. The inference to be derived from this is that the weakness inherent in all the alien houses had already begun to show itself in the community at Charing. The management of the estates in England was entrusted to agents in this country, with the consequence that maladministration of their affairs was very apt to take place,[1] and, as a result, opportunities frequently arose for the interference of neighbouring magnates or of the King himself with the affairs of the alien religious houses.

Complications of this nature must have taken place about this time at the House at Charing. In the year 1283 a certain Brother Lupus appears upon the scene for the first time. His position in England seems to have been that of envoy coming from the Pope, but in the same record he is described as a priest, envoy and preceptor of the Houses in England and Ireland of the Prior and Convent of the Hospital of St.

---

[1] An instructive example is afforded by the exploits of Ralph de "Runcevill," who is stigmatised as a vagabond monk, but who was nevertheless strong enough to retain possession of the Priory of Goldcliff in the Marches of Wales (near Newport, Monmouthshire) in spite of the efforts of his superior the Abbot of the very important Convent of Bec-Hellouin in Normandy, of which the House at Goldcliff was a "Cell," "Calend. Pat. Rolls," 12-14, Ed. II, (1319-1321)

Mary Roncesvalles, and he no doubt had instructions to supervise the management of their estates. The arrival of Brother Lupus, "streight comen fro the court of Rome," with indulgences for the remission of sins, is an interesting proof that even so early as the year 1283 the sale of indulgences was one of the special functions of the brethren of Roncesvalles, and was no doubt a source of considerable income to the Priory. Chaucer, writing a hundred years later, alludes, in his characteristic ironical manner, to this side of the activities of the Canons of Roncesvalles;[1] and even so late as the year 1432, when the House in London had come under the influence of the English clergy, a special effort was made to preserve this source of profit.

The year 1290 must have been notable in the annals of the Hospital, for in that year died Eleanor of Castile, the wife of Edward I, at Harby, near Lincoln, and the King in pious memory built a sculptured cross at every place where the body of his consort rested during the funeral procession to Westminster. The last station in this progress was at the village of Charing. The hospitality of the brethren must have been taxed to the utmost to provide accommodation for the retinue accompanying the King, even if supplemented by the exertions of the neighbouring hermitage of St. Catherine. The cross at Charing was completed in the year 1294, and the brethren no doubt at this time had many opportunities of conversing with the artists and handicraftsmen who formed the very flourishing and remarkable school of art at Westminster, and who were so enthusiastically encouraged both by Henry III and his son Edward. It is quite possible that the Chapel of the Convent may have benefited by the advice, or even by the workmanship of Alexander "the Imaginator," of Abingdon, and William de Ireland, whose artistic handiwork formed so prominent a feature of the Eleanor Crosses.

The next records show that officials with foreign names are in charge of the estate of Roncesvalles in England. In 1292 William de

---

[1] "A Somner was ther with us in that place,
That had a fyr-reed cherubinnes face."

* * * *

"With him ther rood a gentil Pardoner
Of Rouncival, his freend and his compeer,
That streight was comen fro the court of Rome.
Ful loude he song 'Com hider, love, to me.'
This somnour bar to him a stiff burdoun,
Was never trompe of half so greet a soun."

—The Prologue to the "Canterbury Tales" (Dr. Skeat's edition).

Cestre and Peter Arnaldi de Santo Michaele are nominated attorneys for five years for the Prior then staying beyond seas, and again, the following year, we find Lupus de Canone concerned in the management of the Roncesvalles property, having a lay person, Arnaldus de Sancto Johanne, associated with him.

Evidence of the vigour displayed by Brother Lupus in his administration of the affairs of the Convent occurs in an entry in the statement of accounts drawn up by the Executors of Queen Eleanor. It gives the information that the Executors paid the comparatively large sum of 14*l*. 2*s*. to Brother Lupus, Procurator of the Hospital of Roncesvalles, as damages claimed by the brethren on account of their houses at Southampton. This payment was made in the year 1291, and not only indicates that the estate of Roncesvalles in England was being watchfully managed, but also gives us the information that the Convent still possessed the property at Southampton, originally conveyed to them in the foundation-gift of William Marshall.

The brethren of St. Mary of Roncesvalles at Charing did not fail to defend their rights when unjust inroads were made on their property. There are indications that efforts, stimulated no doubt by the Mother House, were made after periods of lax management—numerous in the troubled times that followed—to repossess themselves of the rents and property seized by powerful neighbours. These efforts were in many cases successful, partly by the good will of charitably disposed persons, partly by the influence of the Crown, but mainly by the sturdy support of the rights of their House before the King's Court.

In the year 1294, the Prior of the Hospital claimed, by writ of entry, one toft with appurtenances in Westminster from Adam, son of Walter the Scot. It was admitted that the toft and tenements had been held fifteen years previously by the Prior, who had lost them by default, as he did not appear before the Court when the ownership of the property was in question. The Convent made good its claim, though it seems that Adam was quite willing to restore the property to the Convent, but a special inquiry had to be made to show that there was no collusion in permitting this property to pass in mortmain to the religious house. It is of interest to note that the Prior, Garcia de Ochoa, died in November, 1278, and was succeeded by the Prior Juan. In the year 1279, when this property passed by default, difficulties may have arisen on account of an interregnum at Roncesvalles.

To this period an incident should probably be referred to which attention is drawn in an undated petition from the Prior, requesting that property lying before the Cross at Charing, to the extent of 3 acres, and certain rents, should be restored. This property had been held for a period of ten years by a certain John of Lincoln, Burgess of London, and on his death had passed into the hands of the King on account of default on the part of the Attorney of the Prior and Convent. This petition quaintly recites as part of the evidence that the property belonged to the Convent, that the fact was a matter of common knowledge, "come les gentz dil pais le sauont bien et toute la veisinetee." The little incident has a strong resemblance to other successful claims for their lost lands made under the stimulating influence of Brother Lupus.

During the troubled times when England was engaged in Continental wars, soon to become almost continuous, communication between Gascony and England must have been so difficult as to be well-nigh impossible to men of peace. Convoys under military protection were in imminent danger of capture, and from what we know, especially in the case of naval warfare at this period, there were few of the vanquished who escaped death. In addition to the dangers of travelling another source of great difficulty was felt by the Prior and his officials. The King was in constant and urgent need of money to permit of the prosecution of his warlike policy, and his agents were not too scrupulous as to how it was obtained. If it could be represented that the property of the alien religious houses in the King's dominions could be used for the support of his enemies abroad, or if it could be urged in extenuation that funds sent abroad by the alien communities could be captured in transit, it is evident that the King would have many excuses and would exercise little scruple in levying heavy contributions on the property of the alien clergy in this country, or even of confiscating it entirely. It was under these conditions that the earliest suppressions and confiscations of the alien houses took place.

In 1321 we have a very suggestive record that William Roberti, Canon of the Hospital of St. Mary, is appointed Proctor-General in England for the recovery of their lands and rents. The late Proctor, John de Roncesvalles, had died, and the Prior in Navarre,[1] not being informed of the fact, did not appoint a new Proctor, "war and other impediments hindering them, so that their lands and rents were taken by divers men." Immediately following, letters of protection are given to William Roberti to aid him in his task, "in consideration of the benefits constantly given in that Hospital to poor pilgrims visiting the shrine of Santiago." As the result of this vigorous action the House of St. Mary Roncesvalles, at Charing passed through a period of comparative prosperity, for so late as 1335 a strong policy still seems to have been pursued. In that year there is an interesting record of the recovery of 10 acres of land known as "Roncesvalcroft," in Kensington. It was stated to have been abandoned by the brethren and was in the occupation of a certain Simon de Kensyngton. In such matters, however, the King's agents were usually very active. Simon de Kensyngton did not long remain in possession, for the watchful eyes of William Trussel and Walter de Hungerford, the King's escheators, were upon him and they claimed the land for the Crown. The legal argument in this dispute goes on to state how the land, not being held directly from the Crown, was restored to the brethren.

---

[1] Andrés Ruiz de Medrano; *ob.* August 21, 1327 (?).

It was in the second quarter of the fourteenth century that the community of St. Mary of Roncesvalles in this country appears to have been most prosperous. The Convent at Charing Cross was the headquarters of the brethren in our islands. The Procurator for the Prior who managed the estates and collected the revenues had his residence there. The property they possessed in London was the most valuable, and consisted of plots of land in various parts of the suburbs, as well as at Charing Cross, but the Convent also possessed a considerable amount of property in Canterbury and at Oxford. Evidence remains that they derived revenue from property in Norwich and that they had possessions elsewhere in England, in Wales, in Ireland, and in Scotland. The income derived from these possessions was sufficient to permit of a subsidy towards the support of the Mother House in the Pyrenees.

At Charing Cross itself the Priory possessed a piece of land fronting on the river and extending back to the roadway between London and Westminster. The depth of this plot was then not so great as it is now, for the waters of the river extended much nearer to Charing Cross than at present.[1] The position of Inigo Jones's well-known watergate at the foot of Buckingham Street, the last relic remaining of York House, indicates the line of the river bank at a date over two hundred years subsequent to the time now under consideration.

Occupying the most easterly part of the river frontage was situated the Church of the Convent. This Church, or Chapel as it was usually called in London, was built soon after the foundation of the Convent, but there is evidence that considerable alterations and additions were made much later, perhaps at the end of the fourteenth, and again during the last phase of the existence of the house, in the fifteenth and sixteenth centuries. Some idea of the appearance of the Chapel and the neighbouring buildings may be gained by studying two ancient drawings still in existence made while the conventual buildings were standing.

---

[1] Charing Cross stood approximately on the site now occupied by the statue of King Charles I.

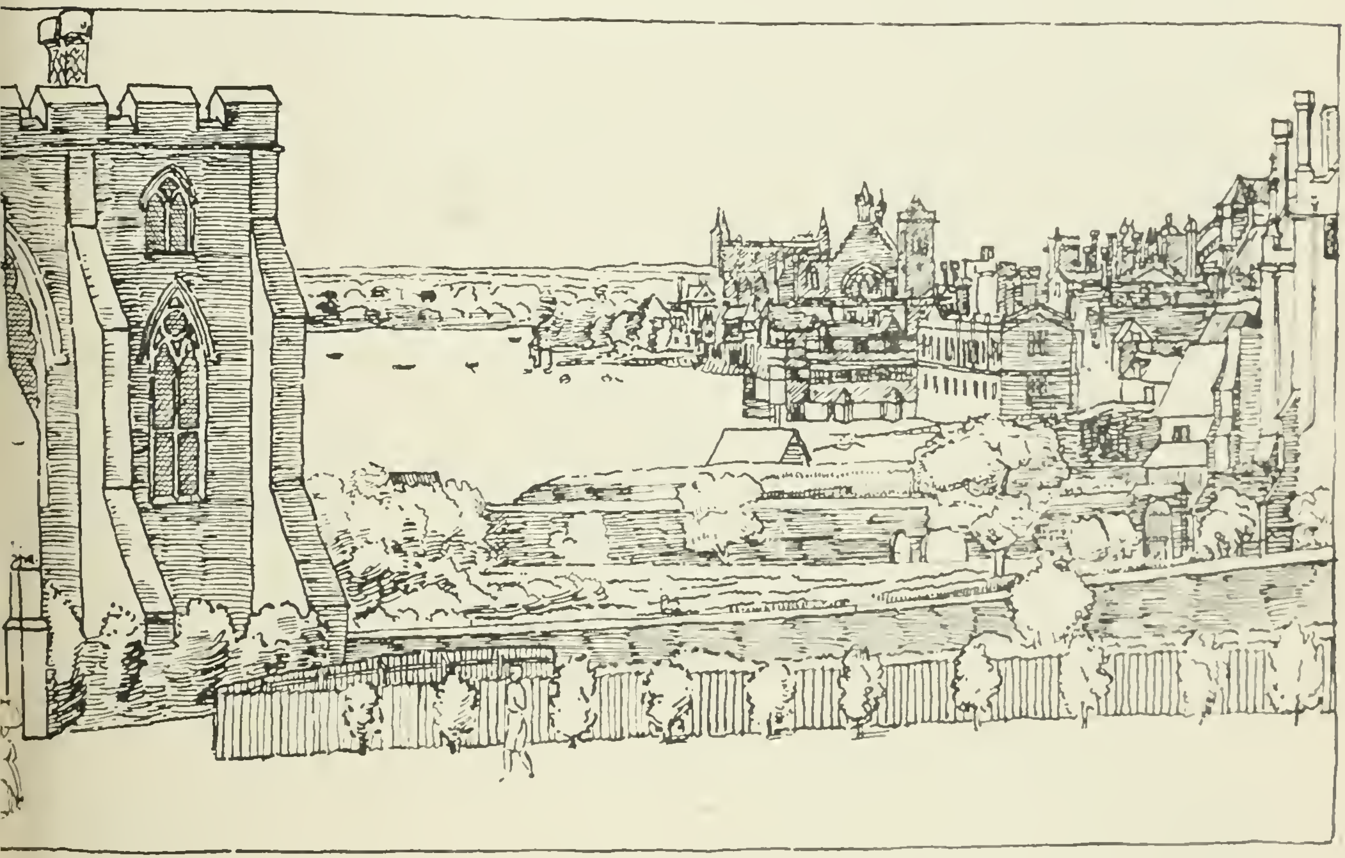


FIG. 8.

After an ancient drawing in the Gardner collection. On the left is part of the south end of the chapel of St. Mary Roncevall; in the foreground and to the right the gardens of the Convent. In the distance the river and the buildings of Whitehall and Westminster.

One of these is the well-known sketch of London by Anthony Van den Wyngaerde, dating from the middle of the sixteenth century. The other is a very beautiful sketch in the Gardner collection which shows a portion of the south-western end of the chapel, the gardens of the Convent, and in the distance Whitehall and Westminster. Judging by the evidence thus obtained, the chapel consisted of a rectangular nave, built of stone. The type of work indicates that it was built about the middle of the thirteenth century. There appear to have been two storeys in this building, the lower storey with three large pointed windows, and the upper storey with three smaller windows also pointed. The upper part, with the small windows, may have formed the clerestory. It is possible, however, that the upper part of the church was cut off from the lower part, and that this upper storey was lighted by the three smaller windows alluded to. Instances of this arrangement are known to have occurred in the churches belonging to hospitals. In such cases part of the church served the purpose of sheltering the sick, while at the eastern end was the chapel proper, arranged so that the sick should have the full benefit of the services of the church.

The pitch of the chapel roof was steep, the form most easily constructed at the period of which we speak, and was no doubt covered with lead. A belfry was situated at the north-eastern end of the chapel. Certain buildings of a much later date than the main part of the edifice, and probably built of brick, are seen to have been added to the northern and southern ends of the chapel, and along the river front. From a terrace on the south-east side of the chapel stairs led down to the water's edge. Immediately to the west of the chapel were the Convent gardens, extending in the direction of the roadway to Westminster, and partly terraced to the river bank. Lying back from the chapel were the conventual buildings and other tenements in the possession of the community. These appear to have been arranged on both sides of a court which opened on the high road close to the cross.

It is stated that over the doorway of each of these houses was sculptured a cross, according to the use of Roncesvalles. There also appears to have been a Latin inscription around or near the doorway of the chapel indicating the date of an addition or restoration in the time of Henry IV. The exact position occupied by the Hospital itself cannot be now identified unless, as is very probable, the chapel itself did duty both as a church and a hospital. The churchyard of the community was probably situated in the lands to the southwest of the conventual buildings. The situation of the chapel corresponds approximately to the middle section of Charing Cross Railway Station in alignment with York Gate and extending towards the land now occupied by Craven Street and Northumberland Avenue.

THE BLACK DEATH (1348-49).

The event which seems to have done more than any other single cause to depress the fortunes and to change the future relationships of the foreign community of St. Mary was the catastrophe of the Black Death. The plague visited London in the autumn of 1348. Its ravages were serious in the early days of November, and the condition of affairs had produced so much alarm that Parliament was prorogued on January 1, 1349. A further prorogation occurred on March 10, the reason given being that the "pestilence was continuing at Westminster, in the City of London, and at other places, more severely than before (*gravius solito*)." It had diminished, or almost disappeared, in London by the end of that year. The clergy appear to have suffered throughout the country even more severely than the rest of the populace—evidence that they did not fail in their duties during that terrible period. Geoffrey le Baker, a clerk of Osney, says, "Of the clergy and cleric class there died a multitude known to God only."[1]

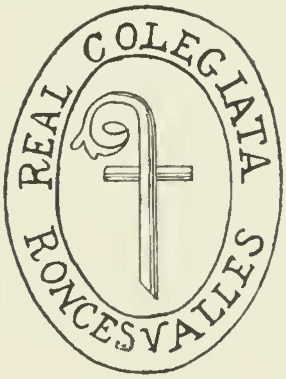


FIG. 9.

The cross according to the use of Roncesvalles, from a stamp now used in the "Real Casa." This ensign "unites in one figure the Cross, the Crozier, and the Sword."

What actually happened at Charing Cross can only be guessed, but there are very clear indications that the Convent of St. Mary Roncevall suffered severely. The deaths among the brethren were probably numerous, for no one sufficiently important seems to have survived to uphold the interests of the parent House. The depressed state of the Convent is the more striking as the calamity occurred after a period of great prosperity.

---

[1] Creighton, "History of Epidemics in Britain," 1891, Camb., i, chap. 3.

When the plague ceased and for some time after, the affairs of the Convent appear to have been in complete confusion. The immense mortality during the year of the prevalence of the plague disordered to a serious extent the whole executive of the country, and especially affected the Church. In some cases the community in the smaller convents died out entirely, in others the senior members and officials completely disappeared from the records, and in all cases serious losses must have occurred. This fatality was not confined to the monastic clergy alone; those holding benefices outside the religious houses perished probably in greater numbers. The consequence was that throughout the country rapid institutions to vacant benefices had to be made to carry on the duties of those who had fallen, and frequently unlettered, and in some cases unworthy, clerks succeeded to important charges. These difficulties must have been much accentuated in the case of alien houses. They suffered, as did all the other religious communities, and in addition, they felt the difficulty of being remote from the parent House. Officials who would have had the interests of the House at heart could not be sent from abroad to take charge on short notice, and the Prior at Roncesvalles, no doubt, did not even know of the deaths of his subordinates at Charing Cross. The vacant benefices in the possession of the alien houses were sought for and obtained by clergy on the spot who had influence, and there can be no doubt that the conclusion is correct, that many of these persons were more concerned in advancing their own interests and in retaining the possessions thus secured, than in guarding the rights of the foreign abbey or priory. Not only, however, did the local clergy secure the vacant benefices and property, but in many cases the property of the alien houses was taken possession of by their influential neighbours, sometimes without opposition, when the original possessors had entirely disappeared, at other times by the high hand when the rightful owners were few or feeble.

The Conflict of Interest between Aliens and English Clergy at Saint Mary Roncevall (1350-1414).

In spite of these adverse conditions the house of St. Mary Roncevall survived, although new influences appear directing its affairs. The earliest records after the Plague show that English clergy were in possession of the Church and Hospital, and the title of Warden is made use of for the first time by the chief clerical official. Special interest appears to have been taken in its affairs by the Crown, perhaps because its estate afforded a ready source of revenue, but more likely on account of the proximity of the Convent to the Royal Palace at Westminster. The Church and Hospital afforded convenient opportunities of preferment and of income to the clergy connected with the Chapel Royal of St. Stephen or of the Royal Household.

The first records after the Plague are of special significance. In 1379, in the reign of Richard II, the chapel and lands of St. Mary Roncevall were seized into the King's hands in accordance with the statute dated at Gloucester, "for the forfeiture of the lands of schismatic aliens," and in accordance with the policy of the Crown at this period to suppress all the alien religious houses. At this time there was a certain Nicholas Slake, a clerk, who, wise in his generation, had not failed in procuring preferment and much advantage from the Church. He possessed various benefices throughout the country, and finally became Dean of the Chapel Royal of St. Stephen, Westminster, in the year 1396.[1] Nicholas Slake had obtained possession of the revenues and had become Warden of the Hospital and Chapel of "Rounsyvale," probably when the Crown took possession of the property after the forfeiture of 1379. In 1383, we find that the King grants a writ of aid for Ralph Archer, Proctor of Nicholas Slake, Master of the Hospital of St. Mary Roncevall, "to arrest and bring before the King and Council all persons whom he shall prove to have collected alms in the realm as Proctor of the Hospital, and converted the same to their own use."

It seems probable that an effort had been made by Nicholas Slake to put the affairs of his church in order, either on his own initiative, or on account of the renewed interest taken in the house at Charing Cross by the Mother Convent. It is noteworthy that about this time the Prior and brethren at Roncesvalles commenced a process at law to claim their property. An inquisition took place before the King's Court at Westminster into the foundation of the Hospital, and as it appeared in evidence that the chapel and its property belonged to the Prior of Roncesvalles, it was restored (April 23, 1383).

There now appears to have been a short period of quiet and good fortune for the brotherhood. It will be remembered that the years 1390-92 are known as the three "quiet" years of the Hundred Years' War with France. Peaceful communications were restored between

---

[1] Hennessy, "Novum Repertorium Ecclesiasticum Parochiale Londinense."

Navarre, through France to England, so that we are not surprised to find that in 1389, Garcias, a Canon of Roncesvalles, is ratified as Warden of the Chapel of Roncevall by Charing Cross, at the supplication of the King's kinsman, Charles of Navarre. What happened in the next year, 1390, is a little obscure. Garcias does not seem to have been at home or comfortable at Charing Cross, or the influence of the London clergy may have prevailed over the alien, for in that year we note that John Hadham, the King's clerk, is Warden of the Hospital.

The following years must have brought much anxiety to the remnants of the alien clergy in England. They must have become more and more conscious of the insecurity of their tenure. England was once more engaged in deadly war with France; communications between the two countries were constantly interrupted or carried on with great risk and danger, and in the case of the Hospital of St. Mary, the sending of their surplus revenue to Navarre through France must have been regarded by the King, constantly seeking funds for military purposes, with the utmost jealousy. Most of the alien houses had already been suppressed. The continued existence of the House of St. Mary Roncevall, as mentioned above, had been seriously threatened. The affairs, therefore, of the community of Charing Cross must have been in great disorder and can have afforded little satisfaction to the parent House. That the Prior did make efforts to supervise the affairs of the Convent in England is clear, but the control must have been very ineffective.

In 1396, John Newerk obtained the wardenship and the property of the Hospital, including the charters, various apostolic bulls and other documents, and apparently installed himself comfortably in his benefice, for in the year 1399 we find that ratification of the estate of Ronceval was given to Newerk. In the meantime Francis, who was then Prior at Roncesvalles, learned of the doings of John Newerk, and commenced a process against him for having broken into the close and houses belonging to the Prior in the parish of St. Martin's in the Fields, of having removed a sealed chest worth 20*s.*, containing the charters and other muniments of the hospital, and claimed damages to the extent of 200*l.* This action seems to have dragged on for a wearisome length of time, for in the year 1409 special directions are given by the King, that, "whereas the suit has been long delayed, the justices are ordered to proceed therein, but not to give judgment without consulting him." The plea was concluded in Hilary Term, 1409, and judgment was given to the effect that at the time of the trespass the close and houses were the sole and free tenement of the Prior, so that John Newerk was mulcted in damages to the extent of 100 marks, but he was held not guilty in respect of the matter of the chest and writings. Though the Prior was largely successful in this action, his success did not long delay the only possible issue.

SAINT MARY RONCEVALL PASSES INTO THE HANDS OF ENGLISH CLERGY (1414).

The end of the strife between the Navarrese and English clergy for supremacy in the House at Charing Cross was not far off. By the year 1414 the few remaining alien priories and convents were suppressed by Henry V, but what influence this final suppression had on the activities of the Convent of St. Mary Roncevall is not quite clear. English clergy were already in possession of the appointments in the Church and Hospital, and the services of the Convent to the people of London seem to have continued. There arose no question of handing over the property for secular purposes, and probably there was no serious dislocation of the usual work of the House. The management of its affairs must simply have been recognized to be entirely independent of the Prior and his officials. It is to the credit of both parties that this separation was accomplished without severe disturbance, for, as we shall see, communications between the Prior at Roncesvalles and the Warden of St. Mary Roncevall remained on what seems to have been a friendly basis. The English wardens who were now appointed were, so far as is known, men of note, and frequently in close relationship with the Court.

In 1417 Walter Sheryngton, Prebendary of Goderynghill, is confirmed in his possession of the estate and the "free chapel" of Rouncevall in the Diocese of London. During his tenure of office there appears to have been an action at law between the Prior of the Hospital and the Warden, the exact nature of which is uncertain; but during its course the conditions of the early foundation of the Convent at Charing Cross came under discussion.

In 1432 Roger Westwode, who was also a Prebendary of the Chapel Royal, St. Stephen's, was Warden of the Chapel or Hospital of St. Mary Roncevall. He was clearly conscious of the advantages to be gained by the connexion with the House in the Pyrenees, as he obtained a royal licence to receive bulls and letters of indulgence for the profit of his own chapel from the Prior in Navarre, and also to remit alms for the poor and other monies to the Priory. An echo of the old difficulties can be noted in this document, as the royal licence states clearly that the said Priory is "outside our allegiance, and the licence is to continue so long as there is no war between us and the King of Navarre."

The fortunes of the Hospital in the middle fifteenth century can only be judged by inference, but there can be little doubt that it continued to be useful, and that gradually its functions as a place for the cure of the needy sick became more developed. The co-operation of nursing sisters must have also become familiar to the London community by this time. The brethren and sisters had pursued their avocation in tending and in nursing the infirm from very early days in the history of the community of St. Mary both in Navarre and in England. As the religious house became more distinctly a hospital their services must have been in constantly increasing request.

THE ESTABLISHMENT OF THE FRATERNITY OF ST. MARY RONCEVALL (1475).

The year 1475 marks the official commencement of the last stage of the existence of the Hospital. In that year a royal charter of Edward IV records the "foundation of a fraternity or perpetual gild of a master, two wardens and the brethren and sisters who may wish to be of the same in the Chapel of St. Mary Rounsidevall by Charyng Crosse, and of a perpetual chantry of one chaplain to celebrate divine service at the High Altar in the said chapel." In 1478 a grant in mortmain is recorded to the Master, Wardens, Brethren and Sisters of the Fraternity of the said Chapel or Hospital, and of its property, revenues and privileges, for the sustenance of the chaplain and two additional clergy who now seem to have been required for the services of the chapel, and of "the poor people flocking to the Hospital."

In the years following, the affairs of the Hospital seem to have been administered with energy and prudence, for we have records in 1494, 1495 and 1496 of legal proceedings concerning the property and privileges of the Hospital, in which the master and wardens vigorously upheld their position and successfully defended their rights. The litigation, which seems to have gone on intermittently chiefly for the recovery of the ancient possessions of the Hospital, appears to have been brought to a conclusion in the year 1510, when, in the Mastership of Laurence Long, the fraternity paid the sum of 20*s.* into the hanaper for the confirmation of the various charters granted to the fraternity by the King.

Again there seems to have been a period of comparative calm and, no doubt, of successful performance of the duties of the Hospital. The fraternity may have even thought that the storm which burst over the Church in the time of Henry VIII would leave them unharmed on account of the fulfilment of their useful functions in the community, for so late as the year 1542, while William Jenyns was Master, a record can be read giving evidence of their continuing interest and careful management of their affairs. In this year they obtained certain property and a wharf in the parish of St. Margaret, in respect of rents to be paid from a tenement called the "Shippe" and certain lands in the Parish of St. Clement Danes without Temple Bar. This, however, is the last deed recorded of the ancient community, with the exception of the final act which was very soon to take place.

Dissolution of the Fraternity by Henry VIII (1544).

The policy of the King, enforced in many cases by the greed of his agents and other members of the Court, could not leave the Hospital unscathed, and not even the charitable deeds of the fraternity were sufficient to save them from dispersion. The grief with which the master, wardens and members of the fraternity assembled to ratify their last official act in a corporate capacity may be conceived, and it is possible to some faint extent to imagine the feelings of despair and of bitter irony uppermost in the minds of the brethren and sisters when they heard the words of the Deed of Surrender read aloud. In this document the master, wardens, brethren and sisters of the fraternity declared that they are "specially influenced at the present time by divers causes and considerations to give and concede by this Charter to the most excellent and invincible prince, our Lord Henry VIII, by the Grace of God, King of England, France and Ireland, Defender of the Faith and Supreme Head of the Church in England and Ireland," their Church, Hospital, and all other property and privileges. The affixing of their Common Seal to this document concludes the chequered history of the Convent of St. Mary Roncevall at Charing Cross (November 11, 1544).

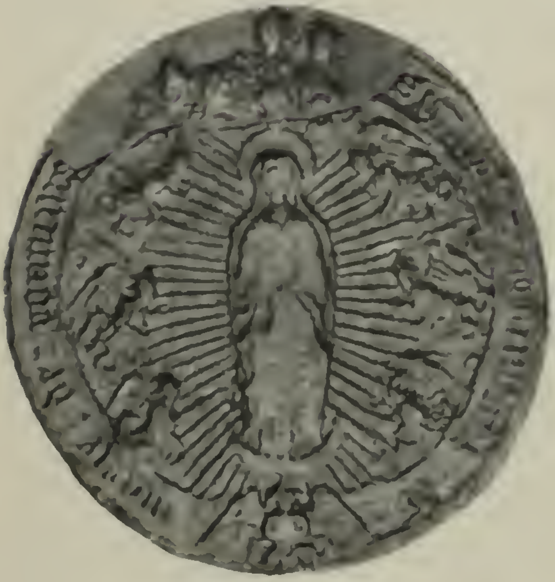


FIG. 10.

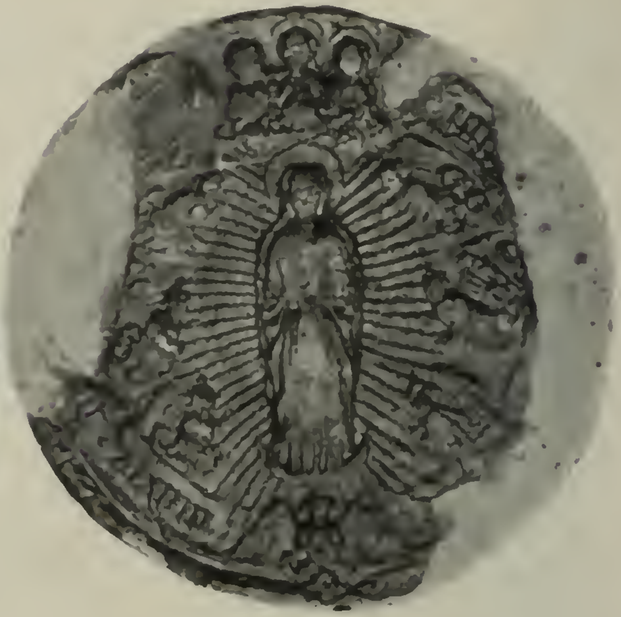


FIG. 11.

Fig. 10.—The common seal of the Fraternity of St. Mary Roncevall.

Fig. 11.—From the imperfect impression attached to the Deed of Surrender.

Though the remaining members of the Community were deprived of their offices and ejected from the home which they had so long possessed at Charing Cross, their lot was not so hard as in the case of many others driven into the world at this time. A pittance from their income was left. There may be read in a book of payments of Edward VI, under the heading "Pencions out of Monasteries" that the guardians of Roncevall were allotted the munificent annual income of 6*l*. 13*s*. 4*d*. Very oddly in this document the larger sum of 8*l*. is entered and crossed out in favour of the smaller amount mentioned. The amount of the pension was measured with parsimonious exactness. Quarterly payments of 33 shillings and 4 pence are entered as being paid to the few surviving members of the fraternity so late as at Christmas, the Annunciation, Midsummer and Michaelmas, 1551 and 1552.

THE LATER HISTORY OF THE ESTATE OF RONCEVALL.

The subsequent fate of the Chapel and Hospital and the land on which they stood may be shortly stated. The site was granted, no doubt with the buildings on it, in the year 1550 to Sir Thomas

Cawarden.[1] Cawarden had been master of the revels to Henry VIII and had established claims to reward or remuneration from the King which had not been satisfied on his death. He was able to establish and enforce these claims in the early years of Edward VI. With some difficulty he obtained in discharge of his claims on the Crown the estate and property of Roncevall and also the church and property of the Blackfriars within the City of London. He seems also to have secured at this time the stewardship of Nonsuch Palace and its lands in the County of Surrey.

The properties of Roncevall and of the Blackfriars soon passed from the hands of Cawarden, probably during the period of wild speculation in land and real estate which followed the dissolution of the religious houses, but the stewardship of Nonsuch he continued to hold with much tenacity in spite of the efforts to dislodge him from this favourite position by Cardinal Pole during the reign of Queen Mary.

Cawarden died in the year 1559. In the meantime the Roncevall property had passed to Sir Robert Brett. It was purchased early in the seventeenth century by Henry Howard, Earl of Northampton, who built himself a town house, described as a "sumptuous palace," on the site, using for the purpose the material of the ancient Convent. This house was completed in the year 1605 and was known for some years as Northampton House. It consisted of buildings arranged on three sides of a quadrangle, and open towards the garden and river. From him the property passed by inheritance to his nephew, Thomas Howard, first Earl of Suffolk, the second son of Thomas, fourth Duke of Norfolk, who completed the quadrangle, the house being then known as Suffolk House. From the Howard family the property passed by an heiress to Algernon Percy, Earl of Northumberland, in 1642; another heiress of the Percy family brought the property to Charles Seymour, Duke of Somerset. While in the possession of the Somerset family and their immediate successors, the Strand front was much improved and acquired the architectural features so long associated with Northumberland House at Charing Cross. By another heiress, Lady Elizabeth Seymour, the property passed into the possession of the present Duke of Northumberland's family.

In consequence of the construction of the Thames Embankment, and the necessity for making a wide approach from Charing Cross, the late Metropolitan Board of Works bought the property from the Duke of Northumberland, in 1874, for the sum of £500,000. Northumberland House, the last of the old river-side mansions, was completely demolished and now Northumberland Avenue and the great buildings near it occupy the site of the Convent and Hospital of St. Mary Roncevall.[1]

---

[1] "A Survey of London," by John Stow, 1603. The edition by Charles L. Kingsford, Clarendon Press, 1908, i, p. 341; ii, p. 350.

THE RONCEVALL PROPERTY IN LONDON; FROM INFORMATION IN AN UNPUBLISHED MANUSCRIPT OF THE BEGINNING OF THE SEVENTEENTH CENTURY IN THE LIBRARY AT RONCESVALLES.[2]

Most of the ancient documents dealing with the history of the Priory have been destroyed or lost as the result of war, fires and other causes. There remains in the Library at Roncesvalles an unpublished MS. dealing with the early history of the Priory and its dependencies, written about the second quarter of the seventeenth century by Don Juan Huarte. This MS. incorporates information obtained by the writer from various sources, and especially under the date April 12, 1623, from a certain Brother Miguel de Spiritu Sancto, who derived it in his turn from a certain Don Francisco Olastro—(Francis Oliver?)—who is stated to have been an ambassador from England in Madrid. This document states that there is situated in the suburbs of London a wide street named "the Street of Our Lady of Roncesvalles." The houses in this street have sculptured over their doorways a single cross according to the use of Roncesvalles. At the end of the street is a large building, now nearly dismantled, which was a sumptuous church in the time of the Catholic Religion. Over the portico of the church were sculptured three crosses of the same form, and in addition there was a clearly engraved Latin inscription to the effect that this church was built and completely finished in honour of the Blessed Virgin by Henry IV, King of England, who, in addition, granted to the Community of St. Mary of Roncevall large possessions and revenues for the service of the Priory and Hospital. The inscription is dated in the MS. 1378, but this date, which is clearly impossible, is probably an error of transcription for 1408, arising from peculiarities in the formation of the figures, and there are other errors to be noted, showing that the information is derived through indirect channels. The inscription is given as follows:—

> "Henricus quartus Dei gratia Rex Angliæ, Iberniæ et Irlandæ, Princeps Gales, et Dux Lancastrie? Hanc ecclesiam sacratissimæ Virginis et Matris Mariæ construxit locupletavit et a fundamentis edificavit, et eam in honorem dictæ Sanctissimæ Virginis et Matris multis possessionibus et redditibus et inquiliniis ditavit, et eam cum suis omnibus possessionibus,

---

[1] "Old and New London," V. iii, by Edward Walford (Cassell, Petter and Galpin). "Charing Cross," by J. H. MacMichael (Chatto and Windus), 1905.

[2] The author is indebted to Don José Urrutia, the Abbot-Prior, for a précis of this document.

inquiliniis subditis et redditibus donavit in donum perpetuum ordini et hospitali generali coenobii Sanctæ Mariæ Roncesvallis in anno domini Salvatoris nostri Jhesu Christi, MCCCLXXVIII."

The document goes on to say that the Priory possessed in England property including the Chapel and Convent at Charing Cross ("Caringrasso") of the yearly value of 9,300 pounds English money, corresponding to 8,223 Spanish ducats, and that it also owned property in Canterbury ("Conturbel") of the yearly value of 4,000 pounds, and in Oxford ("Oxonia") of 5,700 pounds. A Procurator was appointed directly by the Abbot at Roncesvalles who had his headquarters in London at Charing Cross, and had complete powers of administration to deal with the property of the Convent scattered through England, Scotland, and Ireland, and he also directed the Hospital and other enterprises of the Brotherhood.

The Huarte MS. also states that, in the ancient archives of the Abbey there existed a record in alphabetical arrangement, from which it is gathered that Henry VI of England, finding that no official was being sent from Roncesvalles, directed one of his chaplains to obtain from Roncesvalles an account of the property in London and Charing Cross belonging to the Priory: "Las pertenecientes á la capilla y encomienda de Roncesvalles situada junto á Caringrasso de Inglaterra," "and a warrant to collect the income and charitable contributions and send them to Roncesvalles for the maintenance of the clergy and the poor. There is also a statement on the authority of a "military personage in the City of London," that there existed in London a large house which had belonged to Roncesvalles, as shown by the crosses of the special form used by the Order still to be seen on the stones, and that this house had been converted into a seminary of the Anglican Church.

It will be observed that much of the information in the Huarte MS. is traditional and cannot be accepted without careful collation with the more complete and authentic information contained in the English records. It is, however, of much interest to know that a document perpetuating the memory of the Hospital of Roncevall in London still exists in the parent House.

THE ILLUSTRATIONS.

FIG. 1.—The Chapel of St. Mary Roncevall on the bank of the Thames previous to 1544. The chapel is of the middle of the thirteenth century, in two storeys, with later additions, probably of the Tudor period, to the south of the church and at the north-east angle. The tower and belfry are at the north-east end of the church. The chapel is built on a terrace, faced by a high wall, pierced by a door giving access by steps to the river. The sketch gives indications of portions of the conventual buildings, some of which may be identified by referring to the inventory contained in the grant to Sir Thomas Cawarden; for instance, the gardens, the churchyard, wharf, the almshouse. The Cross at Charing, St Martin's Church of that period, other features in the village of Charing, and St. Giles's in the Fields, may be identified.

FIG. 2.—A chart of the Western Pyrenees, showing the roads through the passes, and the position of Roncesvalles and Ibañeta.

FIGS. 3 and 4.—The effigy of William Marshall, Earl of Pembroke (*ob.* 1219), in the Temple Church.

FIGS. 5, 6, and 7.—The effigy of William Marshall, Earl of Pembroke, son of the preceding (*ob.* 1231). These figures of the Marshalls are from Edward Richardson's "Monumental Effigies of the Temple Church." Longmans, 1843. William Marshall, sen., the regent, and his son were closely associated with the Knights Templars, and benefactors of the Order. It will be noted that the effigy of the father shows the figure in a straight position, whereas the effigy of the son is in the cross-legged attitude. The question is naturally raised as to the significance of the cross-legged position. There is no doubt that William Marshall the elder did go to the Holy Land in fulfilment of the dying request of Henry, the eldest son of Henry II, in the years 1185-87. In the case of the son there is no evidence of a journey to Palestine, though it is possible that he may have taken part in campaigns against the Moors in Spain.

FIG. 8.—A copy of an ancient drawing lately in the possession of Mr. E. Gardner, now in the collection of Sir Edward F. Coates, Bart. The drawing is supposed to be contemporary and to have been the work of an early Italian artist resident in England. It was purchased at the Strawberry Hill sale by Dr. Wellesley for the Gardner collection; and the Marquis of Salisbury is stated to have several drawings by the same early Italian artist. The sketch shows part of the north-westerly aspect of the Chapel of St. Mary Roncevall, with some of the later Tudor additions. The battlements were probably added when additions were built, perhaps in the time of Henry IV, or later. The Tudor chimneys appearing over the battlements are reminiscent of the work of Cardinal Wolsey at Hampton Court and would have been constructed in brick. The building on the extreme left of the sketch is probably the corner of a north porch. The sketch also shows the gardens of the Convent of which very special note is made in Cawarden's inventory, and in the distance the buildings of Whitehall and of Westminster.

FIG. 9.—Copy of an official stamp now used in the Priory, showing the Cross of Roncesvalles.

FIGS. 10 and 11.—The common seal of the Fraternity and Guild of St. Mary Roncevall. The seal appears to be of the fifteenth century and was no doubt the seal specially mentioned as being given to the Fraternity by Edward IV. The seal is round, the engraved part being 2¼ in. in diameter. Unfortunately the impression is imperfect.

Fig. 10 is from a cast taken by Doubleday in the middle of tho last century.

Fig. 11 is from a cast taken by Mr. Ready from the impression still attached to the Deed of Surrender. It will be noted on careful examination that there are certain interesting differences in the state of preservation of these two casts. The seal on the Deed of Surrender has been backed and strengthened, but this repair does not altogether account for the differences noticed in the impressions. It is possible that another impression may have existed when Doubleday made his cast. The seal represents "the assumption of the Virgin, who is standing on a crescent upheld by an angel and surrounded by radiance. At each side three flying angels issuing from clouds. Overhead in clouds the Trinity. The legend reads:—

'SIGILLU(M COE FRATER)NITATIS BE MARIE DE ROUNCIVA(LL).'"

(Birch's Catalogue of Seals.)

The author cannot conclude this account of the Convent and Hospital without expressing his cordial thanks to those from whom he has sought assistance and criticisms. He desires especially to acknowledge his obligations to Mr. E. Salisbury and other officials of the Public Record Office for their courteous and patient guidance; to Mr. E. Gardner for his kind permission to see the valuable collection of material illustrating the history of London formerly in his possession, and to reproduce one of the drawings in this paper; to Mr. Herbert Wigglesworth and his assistant, Mr. L. H. Glencross, for drawings of the Chapel of St. Mary, and for important criticisms respecting its structure and architectural features; and to Don José Urrutia, the Abbot Prior, and Don Ignacio Ibarbia Fernandez de Guevara, Canon of Roncesvalles, for much information respecting the present state of the Convent, and for their sympathetic interest in the history of one of the ancient "cells" of the Real Colegiata.

CALENDAR OF THE HOSPITAL OF ST. MARY RONCEVALL, CHARING CROSS.

ANNO

1229. Letters of Protection to the Brethren of St. Mary Roncesvalles.

De Protectione. Fratres hospitalis Sancti Marie Roscidi Vallis habent literas de protectione sine termino cum hac clausula:—

"Rogamus vos quatinus cum nuncii ejusdem hospitalis ad vos venerint elemosinas petituri," &c.

Calendar Patent Rolls, 13 Henry III, p. 265.

1232. Record of the grant to St. Mary and the Hospital of Roncevaux (Roscida Vallis) of the gift which William Marshall, sometime Earl of Pembroke, made to them of all his houses at Cherring, and the houses and curtilages adjoining them, formerly belonging to William Briwere, and of 100*s.* at Suthanton, payable from the houses of the said Earl there, of 13*l.* of land in the Moor of Magor and of a carucate of land in Assendon which he bought from Robert de Rochford. 11th August; Wenlock.

Calend. Charter Rolls, 16 Henry III, p. 168.

ANNO

1240. Grant by the King to the Brethren of "Roscida Valle" of 32 acres which they have sown in Pevensey, of land which William Marshall, Earl of Pembroke, gave to them. 26th July: Quiefeld.
Calend. Close Rolls, 24 Henry III, m. 8.

1242. Grant of pasturage by King Henry III beyond the water called "Lador" (Adour) to the Prior and Brethren of the Hospital of St. Mary Roncevaux. La Sauve Majeure.
Calend. Pat. Rolls, 26-27 Henry III, p. 334.

1242. Bond by the King for payment of 90 pounds of Morlaas to Dominic Paschalis, Provost of Roncevaux. La Sauve Majeure.
Calend. Pat. Rolls, 27 Henry III, p. 349.

1253. Simple protection, without term, for the prior and brethren of the Hospital of St. Mary, Rouncevall. 14th February: Windsor.
Calend. Pat. Rolls, 37 Henry III, m. 17.

1253. Protection for one year for the Master and brethren of Roscidevalle, with this clause, that all their beasts may feed throughout the King's land of Gascony, as they have been accustomed to do. 1st October: Benauge.
Calend. Pat. Rolls, 37-38 Henry III, m. 20.

1254. Protection for four years, as above. 26th August; Bordeaux.
Calend. Pat. Rolls, 37-38 Henry III, m. 8.

1278. Henry, son of William of Smalebrok, nominated Attorney for 2 years for the Prior of the Hospital of Roncevaux. Westminster.
Calend. Pat. Rolls, 6 Ed. I, p. 283.

1279. The sum of 16*l*. 13*s*. 4*d*. charged on the pedage of "Maramande" (Myramand), to be paid to the hospital of Roncevaux (Rossidevall). Westminster.
Calend. Pat. Rolls, 7 Ed. I, p. 7.

1280. Henry, son of William of Smalebrok, nominated Attorney for 2 years for the Prior of the Hospital of Roncedevall. Westminster.
Calend. Pat. Rolls, 8 Ed. I, p. 382.

1281. Note in a Record of Accounts that the King's lands granted to Eleanor his mother, of the town of Myramand, are charged with 20*l*. Arvaldenses equivalent to 16*l*. 13*s*. 4*d*. of Tours to the hospital of Rossedevall. Westminster.
Calend. Pat. Rolls, 9 Ed. I, p. 447.

ANNO

1283. Protection for Brother Lupus, Priest, Envoy, and Preceptor of the Houses in England and Ireland of the Prior and Convent of the Hospital of St. Mary Roncevaux, coming from the Pope with indulgences for the remission of sins. Macclesfield.

Calend. Pat. Rolls, 11 Ed. I, p. 75.

1290. G. Prior and the Hospital of Roncevaux (Roscida Vallis) to Edward I, praying the King to be attentive to what shall be told him by certain Brethren of the Hospital who are bearing the present letter to England and to grant their request. 2 Id. July.

Ancient Correspondence, vol. xx, No. 44.

1291. *Emendæ.* Item, fratre Lupo procuratori Hospitali Runcivallis dampnis fratrum dicti Hospitalis adjudicatis coram auditoribus querelarum pro domibus suis Suthamtonæ xiiij *li*, ij *s*.

19 Ed. I. Extract. Liberationes factæ per Executores Dominæ Alienoræ Consortis Edwardi Regis Angliæ Primi : Rot. primus.

(*Vide* Manners and Household expenses of England : p. 105, Roxburghe Club ; edited by T. Hudson Turner, presented by Beriah Botfield : 1841 (London, William Nicol, Shakespeare Press).

1292. William de Cestre, and Peter Arnaldi de Sancto Michaele nominated attorneys for 5 years for the Prior of Roncyvall staying beyond seas. Westminster.

Calend. Pat. Rolls, 20 Ed. I, p. 476.

1293. Lupus de Canone, preceptor of the Houses of Ronceval in Bordeaux and Arnaldus de Sancto Johanne, a lay person, nominated attorneys for the Prior of Ronceval (Roscidevall), staying beyond seas for three years. 12th May ; Westminster.

Calend. Pat. Rolls, 21 Ed. I, p. 14.

1293-94. The Prior of the Hospital of Rosci de Vall seeks against Adam, son of Walter the Scot, one toft with appurtenances as the right of the said Hospital, by writ of entry. A predecessor of the Prior is admitted to have held this toft and tenements 15 years previously (in 1279).

Assize Rolls, No. 514, 22 Ed. I, m. 21.

Probably late Ed. I, or Ed. II. A petition from the Prior of the Convent and Hospital of Roncevall to restore to them property consisting of a site before the Cross at Charing, and also certain other small rents and three acres of land which John of Lincoln, Burgess of London, had held

ANNO

for a period of ten years, and which on his death, on account of the default of the Attorney of the said Prior and Convent and Hospital, were taken into the hand of the King. The petition requests the restoration of this property to the Prior and Convent to hold them as they had been in the custom of doing "come les gentz dil pais le sauont bien et toute la veisinetee." Undated.

Ancient Petitions, 9635.

1310. Evidence of property held in Norwich by the House of Roncevaux, in a licence for alienation in mortmain by William But of Norwich, to the Friars Preachers of that place. 30th March ; Westminster.

Calend. Pat. Rolls, 3 Ed. II, p. 222.

1321. William Roberti, Canon of the Hospital of St. Mary Roncevall, appointed Proctor in England for the recovery of their lands and rents. Their late Proctor, John de Rouncevall, having died, and not being aware of his death, they did not appoint a new Proctor, wars and other impediments hindering them, so that their lands and rents were taken by divers men. 24th August ; Westminster.

Calend. Pat. Rolls, 15 Ed. II, p. 23.

1321. Protection granted to the messengers sent to England by William Roberti, Canon of the Hospital of St. Mary Roncevall, and Proctor-General in England of the Prior and Convent of that place, in consideration of the benefits constantly given in that hospital to poor pilgrims visiting the shrine of Santiago. 25th August ; Westminster.

Calend. Pat. Rolls, 15 Ed. II, p. 15.

F. (?) Prior and the Hospital of Roncevaux to Edward II, on behalf of the citizens of Bayonne, greatly impoverished by the late wars.

Ancient Correspondence, xxxiv, No. 167.

1335. An account of the abandonment of the 10 acres of land known as "Ronsevalcroft," in Kensyngton, by the brethren of the Hospital of Roncevaux ; how the land was taken by Simon de Kensyngton without the King's licence, escheated to the Crown, and finally restored to the Convent. 12th July ; Carlisle.

Calend. Close Rolls, 9 Ed. III, p. 423.

1348-49. THE BLACK DEATH.

1379. The chapel and lands of St. Mary Rounceval seized into the King's hands in accordance with a statute, dated at Gloucester, for the forfeiture of the lands of schismatic aliens. 2 Ric. II.

Cf. Close Rolls, 10 Henry IV, m. 7. 1409, *vide infra.*

ANNO

1382. Nicholas Slake,[1] Master of the Hospital of St. Mary Roncevalles.

The King grants a writ of aid for Ralph Archer, Proctor of Nicholas Slake, to arrest and bring before the King and Council all persons whom he shall prove to have collected alms in the realm as proctor of the Hospital, and converted the same to their own use. 18th July. Westminster.

Calend. Pat. Rolls, 6 Ric. II, p. 195.

1383. Inquisition into the foundation of the Hospital of Rouncevall, before the King's Court at Westminster.

Plac. coram Rege apud West. de term. Mich. 7 Ric. II, Rot. 21 Middx.; also Chancery Miscellanea, $\frac{68}{466}$.

It appears that the Crown had resumed possession of the Hospital and land and all its possessions after the forfeiture of 1379, and that a cleric, Nicholas Slake, had obtained the Wardenship of the Hospital and Chapel of "Rounsyvale." On inquisition, however, it was shown that the Hospital and Chapel and its property pertained to the Prior of the Hospital of the Blessed Mary of Rounsyvall, and was accordingly restored. 23rd April.

Cf. Dugdale, Monasticon Anglicanum, edit. 1820, vi, pt. 2, p. 677.

1389. Garcias, Canon of Roncivale, ratified as Warden of the Chapel of Roncivall by Charyncroix, at the supplication of the King's kinsman, Charles of Navarre. 16th November; Westminster.

Calend. Pat. Rolls, 13 Ric. II, p. 152.

1390. John Hadham, the King's clerk, Warden of the Hospital of St. Mary of Ronsyvale at Charryng by Westminster. 18th February; Westminster.

Calend. Pat. Rolls, 13 Ric. II, p. 205.

1396. Grant for life to John Newerk of the Wardenship of the Hospital of St. Mary Rouncyvall by Charryng Crouch. 20th October; Westminster.

Calend. Pat. Rolls, 20 Ric. II, p. 30, pt. 1, m. 15.

1396. Grant to John Newerk of the Hospital of St. Mary Rouncyvall. 5th October; Calais.

Calend. Pat. Rolls, 20 Ric. II, p. 44, pt. 1, m. 6.

---

[1] Hennessy: "Nov. Repert. Ecclesiast. Paroch. Londin." Nicholas Slake, Prebendary of Wenlakesbarn; of Erdington in Briggenorth; of Shirecote in Tamworth; Rector of St. Mary Abchurch; and Dean of St. Stephen's Chapel Royal, Westminster (1396).

ANNO

1399. Ratification of the estate of John Newerk, Warden of the Hospital of St. Mary Rounceyvale by Charing Crouch. 28th October; Westminster.

Calend. Pat. Rolls, 1 Henry IV, p. 25, pt. 1, m. 16.

1409. Exemplification at the request of John Newerk, of:—

(1) Letters patent dated 5th October, 20 Richard II (1396), granting to him the hospital of St. Mary Rouncyvall.

(2) Letters patent dated 20th October, 20 Richard II, granting to him for life the wardenship of the hospital of St. Mary Rouncyvall by Charryngcrouch. 5th February; Westminster.

Calend. Pat. Rolls, 10 Henry IV, pt. 1, m. 10.

1409. Francis, Prior of the Hospital of St. Mary de Rouncyvall of the diocese of Pampeluna and Warden of St. Mary of Rouncyvall by Charyng Crosse, impleaded John Newerk, clerk, for having broken into a close and houses of the said Prior in the parish of St. Martin's in the Fields, and taken away a sealed chest worth 20*s.*, containing charters, writings, bulls, apostolic instruments and other muniments, and committed other offences to the damage of £200 in the reign of Richard II. John Newerk alleges that the said chapel and all its property had been seized in the King's hands according to the statute dated at Gloucester, 2 Ric. II, and that afterwards the Wardenship of the said chapel was granted to the said John by letters patent, dated 20th October, 20 Ric. II, and that he is not answerable for the above property, etc., to the said Prior without consulting the King, and whereas the suit has been long delayed the King orders the Justices to proceed therein, but not to give judgment without consulting him. Westminster.

Close Roll, 10 Henry IV, m. 7 (see also m. 11).

1409. Record of the above-mentioned plea between Francis, Prior of St. Mary de Rouncyvall, and John Newerk, Clerk, returned on a writ *de causis certiorari*, dated 1st September, 5 Henry V, 1417.

Placita coram rege, Hilary Term. 10 Henry IV, 1409.

This document recites the conditions of the trespass of John Newerk on the Monday after the Feast of All Saints, 21 Ric. II, when with force and arms he broke into the close and houses of the said Prior in the town of Westminster, mentioning the sealed chest and charters and the amount of damage done to the Prior. It continues to recite John Newerk's defence and especially that he, John Newerk, had been granted the custody of the said Chapel.

Judgment: That at the time of the trespass the close and houses were the sole and free tenement of the said Prior—damages for the said

ANNO

Prior 100 marks. As to the said chest and writings the said Newerk is found "not guilty."

Chancery Miscellanea, $\frac{68}{466}$.

1411. Pardon to John Newerk, Clerk, for his outlawry in the County of Middlesex for not appearing before the King to satisfy the Prior of St. Mary Rouncivall . . . of 100 marks which the Prior recovered against him on account of a trespass in the time of Richard II, he having surrendered to the Marshalsea Prison and satisfied the Prior. 5th May; Westminster.

Calend. Pat. Rolls, 12 Henry IV, m. 12.

1417. Confirmation to Walter Shiryngton,[1] Prebendary of Goderynghill, in the Collegiate Church of Westbury, of the free chapel of Rouncevale, in the diocese of London, of his estate and possession to the said prebend and chapel. Westminster.

Pat. Roll, 5 Henry V, m. 10. (By Privy seal.)

1418. Recorda 5 Henry V., pt. 1. "Recordum et processus inter Prior Hosp. beate Mar. ibidem et Custodem Capelle ibidem ubi fit mentio de primata fundatione."

The reference of this note has not been found in the Memoranda Rolls of the reign of Henry V.

1432. Royal licence to "our chaplain," Roger Westwode,[2] Master of the Chapel or Hospital of St. Marie de Roncidevall by Charyngcroix in the diocese of London, his successors or their proctors, to receive bulls and other letters of indulgence for the profit of the said Chapel, from the Prior and Convent of Rouncidevall in Navarre, in the diocese of Pamploma, and to remit alms for the poor and other moneys to the Priory in Navarre, because the said Priory is outside our allegiance, to last so long as there is no war between us and the King of Navarre. Westminster.

Pat. Roll, 11 Henry VI, pt. 1, m. 16.

1440. Grant to John Gourney of a parcel of land, late of the King of Scotland, lying between a plot of the Archbishop of York towards the south, and the chapel of St. Mary Rouncevale towards the north (etc.). 1st April; Westminster.

Calend. Pat. Rolls, 18 Henry VI, pt. 3, m. 12.

---

[1] Hennessy: Loc. cit. Walter Shiryngton, Prebendary of Gevendale in York; of Offley; of Mora, &c.; Chancellor of Duchy of Lancaster; *ob.* 1418. Buried in St. Paul's Cathedral.

[2] Hennessy: Loc. cit. Roger Westrode, Prebendary of St. Stephen's Royal Chapel, Westminster, 1422; *ob.* 1433.

ANNO

1440. Grant of the alien Priories in England and Wales to Henry, Archbishop of Canterbury, and others.

Rymer's Fœdera. 12th September, 19 Henry VI.

1475. Foundation of a fraternity or perpetual gild of a Master, and two Wardens, and the Brethren and Sisters who may wish to be of the same in the Chapel of St. Mary Rounsidevall by Charyng Crosse in the suburbs of London: "They shall form one body, and shall have perpetual succession and a Common Seal"; and of a perpetual Chantry of one Chaplain to celebrate divine service daily at the High Altar in the said Chapel, for the good estate of the King and his Consort Elizabeth, Queen of England, and his firstborn son Edward, and the Brethren and Sisters of the fraternity, and for their souls after death. 28th October; Westminster.

Calend. Pat. Rolls, 15 Ed. IV, pt. 2, m. 10, p. 542.

1478. Grant in mortmain to the Master, Wardens, Brethren and Sisters of the fraternity or gild in the Chapel of St. Mary de Rounceidevale, by Charing Crosse, of the said Chapel or Hospital, and of its property, oblations, and other privileges, for the sustenance of three chaplains celebrating divine service, and of the poor people flocking to the Hospital; provided that they grant for life to Elizabeth Berde, widow, 6 marks yearly for her sustenance, and a fair house for her by the said Chapel or Hospital. 9th March; Westminster.

Calend. Pat. Rolls, 18 Ed. IV, pt. 2, m. 34, p. 114.

1494-95. A suit brought against the Warden of the Chapel of St. Marie de Rounsewal as to half an acre of land. There follows a long legal argument respecting the patronage of the Chapel, and other matters.

Year Book. 10 Henry VII, Easter Term (No. 5).

1495-96. Argument as to whether the Hospital can plead under the name of the Master and Wardens only, or under the full title of Master, Wardens, Brethren and Sisters of Rounceval.

Licence to plead in the former designation appears to have been granted in their patent of incorporation.

Year Book. 11 Henry VII, Trinity Term (No. 12).

1509-10. Laurence Long, Master, Robert Day and William Goodwyn, Wardens of the Fraternity or Gild in the Chapel of Saint Mary Rounceval juxta Charing Cross, pay 20s. into the Hanaper for the confirmation of various letters granted to the Fraternity by the King and certain of his progenitors.

L.T.R. Originalia Roll. 1 Henry VIII, Rot. 139.

ANNO

1542. Will. Jenyns,[1] Master, and John Ap Hoell and Ric. More, Wardens of the fraternity or gild of St. Mary Rouncedevall by Charing Crosse, near London, grant in exchange for three messuages and one wharf in the parish of Saint Margaret, certain rents to be paid from the messuage or tenement called the "Shippe" and a field of land called "Cuppefeld," adjoining a field called "Conninggarfeld of Lyncolnes Inne," in the parish of St. Clement Danes without Temple Barre, Midd.; which belonged to St. John's of Jerusalem. 12th April; Greenwich.

Pat. Roll, 33 Henry VIII, pt. 6, m. 11.
Calend. of State Papers Domestic, Henry VIII, vol. xvii, p. 162.

1544. The Deed of Surrender, whereby the Master, Wardens, Brethren and Sisters of the Fraternity or Gild of the Chapel of Saint Mary of Rounsidevall by Charinge-crosse, in the suburbs of London, concede to the King in perpetuity all rights and ownership in the said Chapel and Church of Saint Mary of Rounsidevall, the Belfry and Cemetery adjacent to the Chapel, likewise all messuages, houses, buildings, lands, tenements, meadows, grazing-lands, pastures, rents, reversions, services, and other hereditaments whatsoever. (11th November.)

Deed of Surrender. No. 138, Augmentation Office.

The impression of the Common Seal of the Fraternity is attached.

1550. (Abstract.) Grant to Sir Thomas Cawarden, knight, one of the gentlemen of the Privy Chamber (in completion and performance of a grant of the same premises made to him by Henry VIII before his journey into France in the 35th year of his reign, the letters patent for which were never made and sealed), of the following premises: All that Chapel of the late Hospital of St. Mary de Rowncevall, in the parish of St. Martin's, late called the parish of St. Margaret's, with the churchyard thereto belonging containing about 1½ roods; also the messuage called the almeshouse, 80 feet north and south by 23 feet east and west; also "le wharff," a stable, and all cellars and land called "le bakeside"; one garden 108 feet by 104 feet; 2 other gardens, 150 feet by 50 feet, and 120 feet by 45 feet respectively; another garden 126 feet by 84 feet, abutting on the south on a piece of vacant ground called Scotland and on the east on the water flowing in "le barge-house" and on the west upon "le comon Sewer"; another garden 102 feet by 84 feet; a messuage; a shop called "le longe shoppe" (the above

---

[1] Hennessy; Loc. cit. William Jenyns was Rector of St. Mary Staining, 1583-84.

ANNO

are in the respective tenures of John Rede, Richard Attsell, Hugh Haward, John Yonge, and Richard Harryson), all which premises are of the clear yearly value of £12 6s. 8d.; to have and to hold to the said Sir Thomas Cawarden, his heirs and assigns for ever, in socage as of the honour of Westminster by fealty only and not in chief; paying yearly to the Court of Augmentations for the chapel and churchyard, 12d.; for the almeshouse, 4s. 8d., and 19s. for the other premises (the rents are given separately for each). 21st January: Westminster.

Pat. Roll, 3 Ed. VI, pt. 10.

AUGMENTATION OFFICE. MISCELLANEOUS BOOKS. No. 259.

Book of payments from 20th March, 4 Edward VI, to 20th March, 5 Edward VI.

1551-52. "Pencions out of Monasteries"

f. 16 d. ROUNDESIVALL.

Alloc'. Gardiani ibidem per annum	vj li. ex^{r}	xiij s.	iiij d.[1]
Paide to them the xij of Aprill for theire quarters pencion due at Christenmas laste paste		…xxxiij s.	iiij d.
Paide to him the xij of Aprill for theire quarters pencion due at Th annunciacion last past		…xxxiij s.	iiij d.
Paide to them the xxij of Novembre for her quarters pencion due at Midsomer last past		xxxiij s.	iiij d.
Paide to them the xxij of Novembre for her quarters pencion due at Mighelmas last past		xxxiij s.	iiij d.

---

[1] The above sum is written below *viij li*, crossed out.

Further Notes on Thomas Dover.

By J. A. Nixon, M.B.

Thomas Dover was known in his own day as the "Quicksilver Doctor," and in present times as the inventor of Pulvis Ipecacuanhæ Compositus, and the discoverer of Selkirk. He came of an interesting and somewhat original family, and himself displayed, throughout a long life, great independence of thought and action. It is not surprising that Dover has left many vivid impressions of his personality upon the profession he adorned and the towns and countries which he visited. His family is said to have belonged to Norfolk, at any rate we can trace it no further back. His grandfather was an attorney who settled to practise in the small Cotswold town of Barton-on-the-Heath in the county of Warwickshire. This is a queer corner of England where Warwickshire, Worcestershire, Gloucestershire, and Oxfordshire seem to jostle each other for possession of some of the beauty spots of the land.

Robert Dover's name has come down to us as a peace-loving lawyer "who never try'd but two causes, always made up the difference." He lived in the reign of James I, and being a man of hospitable and cheerful disposition, he instituted, in imitation of the Olympic Games of Greece, an annual meeting for manly sports and exercises, which became known as the Cotswold Games, on a hill near Campden that bears now the name of Dover's Hill. These games were held yearly until, in 1851, they were stopped by Act of Parliament, having degenerated into a Whitsun gathering of the lowest scum of the population living between Birmingham and Oxford. An interesting book of encomiastic poems was published in 1636 in which many poets of various attainments, amongst them Ben Jonson and Michael Drayton, made verses in honour of Robert Dover and his games. The title of the collection is "Annalia Dubrensia," and Michael Drayton's contribution stands first, headed "To my noble friend, Mr. Robert Dover, on his brave annual assemblies upon Cotswold."

Robert Dover married Sibilla, daughter of William Cole, Dean of Lincoln and President of Corpus Christi College, Oxford; he had four children, two girls and two boys, of whom the elder, Robert, died in infancy. John, his second son, was born in 1614, and is said to have been baptised at Saintsbury; he was one of Prince Rupert's captains, and married Elizabeth Vade, of Barton, by whom he had five daughters and three sons, of whom two lived to adult life. John, the elder, entered Magdalen Hall, Oxford, and resided for four years (1661-65), but did not take a degree. He then studied the law at Grays Inn and made some slight reputation as a dramatist. Ultimately he took orders in the Church, and in 1688 became Rector of Drayton, Oxon, where he died at the age of 82 in 1725. Thomas, the younger surviving son of Captain John Dover, matriculated at Magdalen Hall, Oxford, in 1680, at the age of 16, and seems to have studied medicine there until 1686, when he migrated to Gonville and Caius College. The register of admissions shows his entry in 1686; "Thomas Dover, from St. Mary Hall, Oxford, where he resided six years, admitted pensioner to the scholars' table. Surety, Mr. Lightwine. Matriculated at Magdalen Hall, Dec. 1, 1680. Age 16. Son of John Dover, of Barton-on-the-Heath, Warwicks, gent. B.A., Oxford, 1684; M.B., Cambridge, 1687." Shortly after this time Thomas Dover became the resident pupil of Sydenham in London. He has left a description of his treatment on this occasion: "Whilst I lived with Dr. Sydenham, I had myself the Small Pox, and fell ill on the Twelfth Day. In the beginning I lost Twenty-two Ounces of Blood: He gave me a vomit; but I find by experience, Purging much better. I went abroad, by his Direction, till I was blind, and then took to my Bed. I had no Fire allowed in my Room; my Windows were constantly open, my Bed Clothes were order'd to be laid no higher than my Waist. He made me take Twelve Bottles of Small Beer, acidulated with Spirit of Vitriol, every Twenty-four Hours."

Presently Dover settled in Bristol and achieved honourable distinction as the first medical man who gratuitously offered his services on behalf of the poor, under the care of the guardians of that city. This was in 1696, during an epidemic of spotted fever, of which he wrote later, "About Fifty Years since, the Fever raged so much in Bristol, so that I visited from Twenty-five to thirty Patients a Day for a considerable time, besides their Poor Children taken into their Workhouse, where I engaged myself, for the Encouragement of so good and charitable an undertaking, to find them Physick, and give them Advice at my own Expense and Trouble, for the two first years. All these Poor Children in general had this Fever, yet no more than one died out of the whole Number, which was near two hundred." The hospital where Dover worked is a well-known landmark in Bristol, called St. Peter's Hospital, and now used as the offices of the guardians.

In 1708, he sailed on his famous voyage round the world, two accounts of which were published in 1712. Of these the better known is by Woodes-Rogers, Captain of the "Duke," and Commander of the expedition, while the less known, but better written, description is by Captain Edward Cooke, second in command of the "Dutchess." Callander, in his "Voyages to the Terra Australis" (London, 1768), speaks in terms of the highest praise of this expedition as one of the best organized and equipped expeditions that ever left England. The enterprise was undertaken by a group of wealthy Bristol citizens, several of whom were members of the Society of Merchant Venturers in Bristol. Three of the owners were sooner or later Mayors of Bristol, two were Sheriffs, and one (John Romsey) Town Clerk. The ships are said to have been the property of Joseph Harford, whose family is still one of the most notable in Bristol. The "Duke" and "Dutchess" were legally commissioned by his Royal Highness Prince George of Denmark, then Lord High Admiral of Great Britain, Ireland, &c., "to cruise on the coasts of *Peru*, and *Mexico*, in the *South Seas*, against Her Majesty's enemies the *French* and *Spaniards*. The expedition consisted of six ships, all armed, under the "Hastings," man-of-war, forty-two guns; the "Duke" carried thirty guns and the "Dutchess" twenty-six guns. The voyage was distinguished by three achievements: the taking of the town of Guayaquil, the capture of the lesser "Manila," treasure-ship, and the relief of Alexander Selkirk from his voluntary exile on the island of Juan Fernandez. Dr. Dover was appointed, after a dispute with Woodes-Rogers, to the nominal command of the "Manila" prize, renamed the "Batchelor," frigate. Woodes-Rogers's account of this dispute gives a most unflattering description of Dover, "that it is not for the safety of the rich Spanish prize that Captain Dover command her, because his Temper is so Violent, that capable men cannot well act under him, and himself is incapable." Cooke, however, took Dover's part, and with a majority of the officers protested that he should be appointed to the command. Ultimately he was appointed the nominal commander with two other captains to navigate the ship, with the proviso, "that the said Captain, Tho. Dover, shall not molest, hinder or contradict them in their business." In Cooke's opinion, Woodes-Rogers was no easy man to get on with, while Callander describes Dover as having the reputation of being "of rough temper and could not easily agree with people about him. But his untoward disposition had one good effect, which was this: that it hindered his making any party to support him in his ill-humours." In spite of all differences the expedition returned safely and laden with rich booty in 1711.

Two silver candlesticks still remain in Bristol Cathedral as the thank-offering of John Ramsey, the Town Clerk, for the success of the venture. After his return Dover practised medicine in Bristol, Gloucestershire and London at various times, and made no little stir by his advocacy of the use of crude mercury in the treatment of many diseases. It is suggested that it was Dover who introduced Selkirk to Daniel Defoe, and persuaded the former to entrust his diary to the famous author of "Robinson Crusoe." Tradition relates that Defoe met Selkirk in the Star Tavern in Bristol. The evidence of such a meeting is wanting, but certainly Selkirk conceived a grievance against Defoe for stealing his story and swelling it into the great romance "Robinson Crusoe."

Mr. Colyer-Ferguson has inquired industriously into the family connexions of Dr. Dover, and has brought to light many interesting details: He married soon after leaving Cambridge, though his wife's identity is unsolved. Her Christian name was Joanna, and she was buried at Barton-on-the-Heath, April 27, 1727. Their family consisted of four daughters, of whom the first two were twins, baptized at Barton in 1688, and died young; a third daughter, Elizabeth, married John Opie, and died without issue. The marriage settlement of this daughter is now in Mr. Colyer-Ferguson's possession, and is interesting from the fact that it bears the signature of Dr. Thomas Dover. The fourth daughter, Sibilla, married John Hunt and left many descendants, of whom Mr. Colyer-Ferguson claims to be one.

History and tradition have played strange pranks with Dover's biography, and much confusion has existed between Dr. Thomas Dover and his grandfather Robert Dover. Thomas Dover has been credited by several of the county historians of Gloucestershire with being the founder of the Cotswold games, whilst his grandfather has been stated by the same authorities to be the occupant of Thomas Dover's tomb at Stanway, in Gloucestershire. The facts are as follows: Robert Dover, the founder of the Games, was buried at Barton on July 24, 1652; there is an entry to this effect in the Barton register, but I can find no tablet to his memory there. The tombstone popularly supposed in Barton to be that of Thomas Dover turns out, on close inspection (it is nearly undecipherable), to be erected in memory of "William Sands, who sailed round the world with Dr. Dover." This stone stands against the outside of the chancel wall at Barton on the north side. There is an entry in the register of Stanway, in Gloucestershire, stating that Thomas Dover, M.B., was buried there on April 20, 1742.

I have found two contemporary references to his death :—

(1) *The Oracle or Bristol Weekly Messenger*, i, Saturday, May 1, 1742, No. 5, under domestic occurrences: London, April 27, from the general Evening Post: Deaths—Dr. Thomas Dover, in Warwickshire.

(2) *London Magazine*, April, 1742, p. 206: Dr. Thomas Dover, famous for administering quicksilver to his patients, in the 85th year of his age. The last years of Dr. Dover's life were spent at Stanway House (now the seat of Lord Elcho), with his friend Robert Tracy, to whom he dedicated his famous book "The Ancient Physician's Legacy to his Countrymen." He was buried at his own request in the vault belonging to the Tracy family. This vault is situated under the altar, but no memorials remain of the family or of Dover in the church. Yet oblivion has not wholly overtaken the conqueror of Guayaquil, the homebringer of Selkirk, and the inventor of Dover's powder.

Formulæ Medicamentorum Concinnatæ.

By MACLEOD YEARSLEY, F.R.C.S.

THE admirable remarks on Herbals lately offered to this Section have prompted me to bring to your notice a little book that I have long possessed, which is a good example of the pharmacy of some hundred and twenty years ago. Its title-page, as you see, shows it to be a volume of "*Formulæ Medicamentorum Concinnatæ*," or "Elegant Medical Prescriptions for Various Disorders," of whose elegance you shall shortly judge. They are translated from the Latin of the late Dr. Hugh Smith, and were published in 1796, that being their second edition.

Before inquiring into these formulæ it will be of interest to glance at the short sketch of the life of Dr. Hugh Smith, which precedes them. There are, alas, many men who serve humanity well, at least to the best of their ability, and then pass into oblivion. They do not exactly die "unwept, unhonoured, and unsung," but after a very few years the tears are dry, the honours forgotten, the songs mute. Dr. Hugh Smith was such an one. First a pupil to his father, "an eminent surgeon and apothecary" at Hemel Hempstead, he then took his degrees at Edinburgh, and began practice in Essex, where, we are told, he paid special interest to the intermittent fever "so prevalent in the marshy parts of that county." In 1759 he moved to Mincing Lane and published an "Essay on the Blood, with Reflections on Venesection," and soon became the most eminent of the City Physicians, "though his fame was certainly not established till, by a bold push, he launched his *carriage*, and instead of losing £200 or £300 a year, as had hitherto been the case, notwithstanding his popularity, he found himself in possession of a practice that brought him in upwards of £500 per annum." In 1760 he began to lecture on the Theory and Practice of Physic, and after three years was asked by the pupils of St. George's Hospital to give these in the West End, which he did for several years at the Piazza Coffee-house in Covent Garden. Out of these lectures grew the book before you, first published in Latin under the title of "*Medicamentorum Formulæ ad varias medendi intentiones concinnatæ*," and of which this is the first English translation. In 1765 Dr. Smith became Physician to the Middlesex Hospital, and in 1770 was elected an Alderman of Tower Ward, but soon resigned the latter office and removed to Bridge Street, Blackfriars.

His charity is eulogized in this sketch in the following words: "He did what perhaps few physicians in his great practice would have done, he set apart two days for the poor in each week. To the *very* poor he prescribed gratis; from those of middling circumstances he would never accept more than half-a-guinea; yet so numerous were the applicants for his advice that he has received *fifty* guineas in a day from those half-guinea patients. From the inferior clergy, from subaltern officers, and from public performers, he made it a rule never to take a fee; and he has often been known to give pecuniary aid as well as advice."

He died on December 26, 1790, and not long before is said to have remarked to a lady, who consulted him on a pulmonary disorder, "Madam, I am affected in the same manner as yourself, but my case is *mortal!* You, with care, may recover."

The publication in English of his prescriptions is thus excused on p. vii: "The mode of giving medical prescriptions entirely in Latin . . . is really a burlesque upon the common-sense of mankind. Physicians may indeed be able to *scrawl* a Latin prescription (and to preserve the mystery of their profession they often do scrawl in a most unintelligible manner), yet we experimentally know that apothecaries and their apprentices are not always able to develope these learned enigmas; and hence the most valuable lives may be left at the mercy of a giddy or an ignorant boy." Possibly you will think with me that, even with a clearly written prescription, the most valuable lives were in danger from the treatment.

It is an interesting little book to glance through, for it contains a certain amount of sound advice mingled with much fantastic pharmacy. For instance, in dealing with the treatment of pulmonary tuberculosis, an easily digested diet and pure dry air are insisted upon, combined with a balsamic pill and an expression of millipedes! Among the pharmaceutical agents mentioned as ingredients in these "elegant prescriptions" are emetic tartar, wormwood, calx of antimony, Glauber's salt, saffron, nitre, dragon's blood, steel filings, zedoary, colcothar of vitriol, diascordium, prepared oyster shells, assafœtida, musk, valerian, confection of Paulinus, pill of Rufus, and many others.

For "Chorea Sancti Viti, or St. Vitus's Dance, which is a convulsive disease, probably owing to worms," anthelmintic remedies are advised. Hence Dr. Smith recommends a preliminary emetic of ipecacuanha, followed by a powder of mosaic gold and rhubarb, or filings of tin and conserve of rue, or ½ to 2 dr. of tincture of soot, three times a day, "in any agreeable liquid." "If the disease should not yield to the above, the cold bath and chalybeates will most probably effect a cure."

For intermittent fever Peruvian bark is recommended, preceded by an emetic or aloes and rhubarb.

But the gem of the whole series is the description of "Peripneumonia Notha," which, we are told, has its origin "from a weakened and relaxed state of the vessels of the lungs, and a pituitous lentor, or glutinous disposition of the fluids stagnating in, and obstructing the vessels and glandular follicules," a truly illuminating exposition of the pathology of this disease. Among the prescriptions advised for this evidently serious disorder is the following: "Live Hoglice, one ounce; bruise them and gradually pour upon them old Rhenish wine, Spirituous Cinnamon Water—each three ounces. Having obtained a very strong expression—we are not told whether from the hoglice thus maltreated, or the patient expected to swallow the concoction—add, Antimonial Wine, two drachms; Syrup of Squills, half an ounce. Mix, and take a third part thereof every six hours."

I may mention that "prepared hoglice" are also recommended for the treatment of scrofulous or strumous affections in children.

It is remarkable what a number of filthy decoctions people could swallow but little over a century ago. I have in my possession an old chemist's bill which I have brought with me. You will see that it ran from October 26, 1728, contains 13 pages, with 638 items, and amounted to £71 13s. 1d., which sum was paid—grim irony—by the patient's executors, on August 20, 1730.

Will the therapy of 1913 afford as much amusement to the doctors of 2013?

John Avery (1807-1855).

By Macleod Yearsley, F.R.C.S.

The surgeon whose portrait I am about to show you is one who, when he died at the comparatively early age of 48, had already merited the description accorded to him by the *Lancet* of March 24, 1855, of a "much respected and eminent member of our profession." He is well-nigh forgotten now, but that he deserves to be remembered will, I hope, be apparent from the following short sketch of his all too brief life. From the obituary notice in the *Medical Directory* for 1856 it appears that John Avery was born in 1807, became M.R.C.S.Eng. in 1829, M.D.Paris in 1831, and received the honorary F.R.C.S. in 1843. He began his professional career as a pupil of William Cother, who was one of the surgeons to the Gloucester Hospital, the other surgeon being Robert Fletcher, whose daughter married my relative Dr. James Yearsley, the aural surgeon. Avery later came to London and entered St. Bartholomew's Hospital, where, his biographer says, he "laid the foundation of that distinction as an operating surgeon which he afterwards reached. Unless Mr. Avery had been an excellent anatomist, he never could have adventured on those nice and difficult operations on the palate which have identified his name with some of the important improvements in modern surgery."

After receiving his diploma he continued his studies in Paris and, after taking the M.D. of that University, he, being possessed of an ample fortune, travelled through the various countries of Europe. Whilst he was in Italy war was raging in Poland, and, seeing an excellent field for surgery, he entered the Polish service, and was immediately appointed surgeon-in-chief to a Polish ambulance. He was, however, taken prisoner, his baggage and papers were seized, and being unable to communicate with his friends he, for many months, to quote his own story, "experienced the novelty of living on tenpence a day." On his release he returned to London and began practice as a consulting surgeon, which, as the quaint early Victorian phraseology of the obituary notice says, "is one of the paths to fame which none but a man of high resolve and immovable patience would select." He became Surgeon to the Charing Cross Hospital, his senior colleague being Mr. Hancock.

He was endowed with considerable mechanical talent, as evidenced by his invention of a lamp "for the examination of the outer passages of the body." This lamp is depicted in the portrait I am about to show you, and for it he received two medals, one from the Prince Consort, as President of the Society of Arts, the other from the Great Exhibition of 1851. The latter I now possess and show here.

The *Lancet* remarks that "by means of his lamp and tubes, and reflectors, he was able to examine the ear, urethra, bladder, œsophagus, and larynx, as probably no surgeon had ever examined them before him," a remark which is of particular interest in the light of modern instruments for these examinations. The portrait which I now show is one painted on ivory and shows John Avery with his lamp beside him.

Avery was especially distinguished as a careful and expert operator, cool and wary, and particularly skilful at cleft palate operations. He originated an improved method of dissecting the soft palate away from the vault of bone, and uniting the flaps thus obtained in the centre. He also made improvements in the exploration and treatment of stricture, but most of his work died with him, as he wrote very little; indeed, save for a few cases reported in the *Lancet*, his only published work that I have been able to find is a paper in the *Lancet* for September 21, 1850, entitled "Illustrations of the Successful Treatment of Cleft Palate by the Division of the Levator Palati, Palato-pharyngeus, and sometimes the Palato-glossus Muscles." He appears to have taken great delight in his work, and the notice from which I have already quoted says, "A handsome stump, a symmetrical fracture, an effaced hare-lip, a cleft palate restored, a stricture relieved, would give him the most heartfelt satisfaction."

His private practice does not, however, seem to have been enormous, for the *Medical Directory* notice remarks: "Mr. Avery's practice was not extensive, and for this various reasons may be assigned. In the first place, the time which he had been before the profession was comparatively short, and no man can acquire a large amount of consultation practice in this metropolis who has not served a long apprenticeship to popularity; in the next place he was a man of such high honour and sensitiveness of disposition that he retreated from and repudiated the arts which other successful surgeons have not disdained to use in order to fix the unstable confidence of the public." Perhaps this is why the *Lancet* tells us, "Enemies he had none." No doubt, had he lived he would have taken one of the first places among contemporary scientific surgeons. He is described as a delightful social companion and a true friend. What better epitaph can a man require?

The illness from which he died in 1855 began in the spring of 1853 with obscure gastric symptoms, violent vomiting after food and pain, only allayed by inhaling chloroform, of which he used 3 to 4 oz. daily for weeks. He died practically of starvation on March 5, 1855, when the autopsy showed a sound stomach whilst the lungs were riddled with old and recent tubercle which had been undiagnosed during life.

From all accounts John Avery appears to have been a surgeon worthy of remembrance, and it is on this account that I have ventured to bring him to your notice. To quote once more from his obituary notice, "There have been few surgeons who have passed through life with more general affection, or whose death has been lamented with a more sincere regret."

PROCEEDINGS

OF THE

OYAL SOCIETY OF MEDICINE

VOLUME THE SIXTH

COMPRISING THE REPORT OF THE PROCEEDINGS FOR THE
SESSION 1912-13

LARYNGOLOGICAL SECTION

1805 1834
1907

LONDON
LONGMANS, GREEN & CO., PATERNOSTER ROW
1913

Laryngological Section.

OFFICERS FOR THE SESSION 1912-13.

President—

Herbert Tilley, F.R.C.S.

Vice-Presidents—

G. William Hill, M.D.
T. Mark Hovell, F.R.C.S.Ed.
William Milligan, M.D.
A. Logan Turner, M.D.
E. B. Waggett, M.B.

Hon. Secretaries—

Dan McKenzie, M.D.
E. A. Peters, M.D.

Other Members of Council—

G. C. Cathcart, M.D.
Cecil I. Graham, F.R.C.S.
J. Dundas Grant, M.D.
W. H. Kelson, M.D.
L. Hemington Pegler, M.D.
Sir StClair Thomson, M.D.
P. Watson-Williams, M.D.
F. H. Westmacott, F.R.C.S.
George Wilkinson, F.R.C.S.

Representative on Library Committee—

W. Jobson Horne, M.D.

Representative on Editorial Committee—

Dan McKenzie, M.D.

LARYNGOLOGICAL SECTION.

CONTENTS.

November 1, 1912.

PAGE

Mikulicz's Disease. By JAMES ATKINSON, M.B. 1

By HERBERT TILLEY, F.R.C.S.

(1) Fibroma of the Nasopharynx 2

(2) Specimen of Large Fibroma removed from Patient some Seven Years ago 3

(3) Photographs of a Patient suffering from a Chondro-sarcoma, originating in the Left Nasal Cavity 7

Two Cases of Bilateral Œdema of Nasal Septum. By J. F. O'MALLEY, F.R.C.S. 8

By DAN MCKENZIE, M.D.

(1) Denker's Operation for Maxillary Antrum Suppuration 9

(2) Tuberculosis of the Tonsils and Cervical Lymphatic Glands ... 10

A Simple Tonsillotome. By JAMES DONELAN, M.B. 11

By FRANCIS MUECKE, F.R.C.S.

(1) Epithelioma of the Soft Palate 12

(2) Double Adductor Spasm, caused by Vocal Overstrain (?) 13

By A. R. TWEEDIE, F.R.C.S.

(1) Tonsils and Cervical Glands removed Post Mortem from a Man, aged 47 14

(2) Cartilaginous and Fibrous Growth removed from a Girl, aged 18 ... 15

(3) Specimen showing (?) Ulceration of the Left Internal Carotid Artery from a Boy, aged 1 Year 8 Months 15

By Sir STCLAIR THOMSON, M.D.

(1) Epithelioma of the Larynx in a Man, aged 28 16

(2) Two Cases of Radical Frontal Sinus Operation (Killian) 16

By Hunter Tod, F.R.C.S.

PAGE
(1) Malignant Disease of Left Sphenoidal Region: Proptosis with Blindness of Eye on same Side: Enlarged Cervical Glands on both Sides 19
(2) Marked Infiltration of Ary-epiglottic Fold and Ventricular Region of Right Side of Larynx, together with Partial Fixation of Vocal Cord 20
(3) Tertiary Syphilis and Ulceration of Larynx, causing Laryngeal Obstruction, treated by Neo-salvarsan 20

By H. J. Davis, M.B.

(1) Faucial Mucous Tubercles, Hunterian Sore on the Back of the Neck 22
(2) Enlarged Tonsils. ? Lympho-sarcoma or Lymphadenoma 22
(3) Skiagram showing a Butcher's Wire Skewer in the Right Secondary Bronchus of a Girl, aged 8 23
(4) Skiagram showing a Penny Coin impacted in the Œsophagus of a Woman, aged 25 24
(5) Sluder's Guillotine 25
Case of Pansinusitis. By P. Watson-Williams, M.D. 26
Infiltration of Uvula, Epiglottis and Arytænoids. By C. W. M. Hope, F.R.C.S. 27
Atrophic Rhinitis, showing several unusual Features. By Cyril Horsford, F.R.C.S. 28

December 6, 1912.

Note on Mr. Muecke's Case of Adductor Spasm shown at the last Meeting ... 29

By Herbert Tilley, F.R.C.S.

(1) A Belated Sequel to a Successful Operation 29
(2) Very Large Tonsil in an Elderly Patient reduced almost to Complete Disappearance by Galvano-puncture 31
(3) Ulcerating Growth of Left Vocal Cord, probably Epithelioma ... 34
Extensive Syphilitic Necrosis of Bones in Relation to the Nasal Cavities. By C. W. M. Hope, F.R.C.S. 34
Branchial Fistula. By G. H. L. Whale, F.R.C.S. 36

By W. G. Howarth, F.R.C.S.

(1) Aberrant Thyroid Tumour from the Base of the Tongue 37
(2) Fibroma from the Soft Palate 37
(3) Healed Lupus of the Pharynx and Larynx 38
(4) Kuhn's Per-oral Intubation Apparatus 40
A Small Swelling in the Post-nasal Space. G. W. Badgerow, F.R.C.S.Ed. ... 41
Meningocele in the Nasopharynx. By H. A. Kisch, F.R.C.S. 41
The Fin of a Haddock extracted from the Œsophagus. By C. W. M. Hope, F.R.C.S 42

PAGE
By D. R. Paterson, M.D.
- (1) A Chicken Bone 1¼ in. long removed from the Upper Part of the Œsophagus 42
- (2) Telescopic Œsophageal Tube with the Outer Tube Straight-ended and the Inner Tube Beaked 43

Hyperostosis Cranii. By Edward D. Davis, F.R.C.S. 44

By H. J. Davis, M.B.
- (1) Bullet Injury to the Larynx 44
- (2) Paresis of the Left Recurrent Laryngeal Nerve in a Woman, aged 35 45
- (3) Papilloma of the Nose in a Man, aged 40 45
- (4) A Spicule of Rabbit Bone, ¾ in. in Length, removed by Upper Bronchoscopy from the Trachea of a Boy, aged 5 46

Photographs, untouched Prints, of a Young Woman after the Exhibitor's Double Radical Frontal Sinus Operation. By P. Watson-Williams, M.D. 47

By P. Watson-Williams, M.D., and N. S. Finzi, M.B.
- (1) Sarcoma of the Upper Jaw—Resection of the Left Superior Maxilla and Treatment of Recurrent Growth by Radium 48
- (2) Small Round-celled Sarcoma; Partial Removal and subsequent Treatment by Radium 49
- (3) Sarcoma of the Right Superior Maxilla; Removal of Jaw and subsequent Applications of Radium for Recurrence 49

By J. F. O'Malley, F.R.C.S.
- (1) The Tonsillectome—a New Type of Guillotine or Tonsillotome specially designed for the Enucleation of Tonsils 51
- (2) Tumour of the Right Superior Maxilla 53

Tuberculous Ulceration of the Pharynx with Involvement of the Larynx. By Somerville Hastings, M.S. 54

By Hunter F. Tod, F.R.C.S.
- (1) Tumour of Region of the Left Palate 55
- (2) Swelling and Ulceration of Subglottic Region of the Left Side of the Larynx 55

Post-nasal Tumour. By Norman Patterson, F.R.C.S. 55

Swelling of the Larynx. By W. H. Kelson, M.D. 56

January 10, 1913.

By Herbert Tilley, F.R.C.S.
- (1) Temperature Chart from an Obscure Case of Streptococcal Infection of the Throat 57
- (2) Tuberculous Ulcer on the Right Vocal Cord in an Elderly Man cured by the Application of the Galvano-cautery 60
- (3) Granular Congestion of Left Vocal Cord, probably Specific in Origin... 61

Cyst of the Pituitary Fossa; Operation by the Nasal Route. By C. I. Graham, F.R.C.S. 61

PAGE

Two Cases of Laryngeal Palsy due to Nuclear Lesions of the Vagus. By L. Colledge, F.R.C.S. 65

Congenital Membrane of the Larynx. By George W. Badgerow, F.R.C.S.Ed. 66

By E. A. Peters, M.D.
- (1) Case exhibiting Lingual Gymnastics 67
- (2) Multiple Papillomata of the Larynx 68
- (3) Tumour of the Left Antrum 70

Unusual Form of Syphilitic Laryngitis. By C. W. M. Hope, F.R.C.S.... ... 71

Dysphagia presenting Unusual Features rapidly remedied by Treatment. By W. Jobson Horne, M.D. 73

Tuberculosis of Pharynx and Larynx. By Dan McKenzie, M.D. 74

February 7, 1913.

By C. W. M. Hope, F.R.C.S.
- (1) Treatment of Sarcoma of the Neck (secondary to Tonsil) by Seleniol Injections 75
- (2) Laryngeal Tumour treated with Seleniol 76

Pedunculated Growth of Nose. By W. H. Kelson, M.D. 77

Syphilitic Laryngeal Stenosis with Calcification of the Fascia of the Neck. By T. B. Layton, M.S. 78

Webbing of the Vocal Cords in the Anterior Commissure due to a Shot Wound. By John F. O'Malley, F.R.C.S. 81

By James Donelan, M.B.
- (1) Adhesion of Uvula and Soft Palate to Posterior Pharyngeal Wall in a Girl, aged 12 82
- (2) Combined Tonsillotome-Tonsillectome 84

By H. J. Davis, M.B.
- (1) Sluder's Guillotines 85
- (2) Serrated Adenoid Curette 87
- (3) Swelling in the Right Upper Jaw in a Boy, aged 8 87
- (4) ? Rodent Ulcer of Orbit... 88
- (5) Lupus of the Tongue 88

Case for Diagnosis. By T. Jefferson Faulder, F.R.C.S. 89

Chronic Pemphigus. By E. A. Peters, M.D. 90

By Douglas Harmer, F.R.C.S.
- (1) Exhibition of Specimens from a Case of Suppuration of the Antrum due to *Aspergillus fumigatus*, with a short Note of the Case ... 91
- (2) Specimens of *Artemia salina* from the Nose (a New Form of Sea Serpent) 93

Ulceration of Pharynx and Larynx. By Harold Barwell, F.R.C.S.... ... 94

March 7, 1913.

PAGE
Larynx removed (Post Mortem) from a Man who had worn a Tracheotomy Tube for Eighteen Years. By HERBERT TILLEY, F.R.C.S. 95

By WALTER HOWARTH, F.R.C.S.
(1) Killian's Apparatus for Suspension Laryngoscopy 97
(2) Piece of Broken Tracheotomy Tube removed from the Right Bronchus 99
(3) Papilloma of Soft Palate 99

By DAN MCKENZIE, M.D.
(1) Laryngectomy subsequent to Tracheotomy for Epithelioma of the Larynx 100
(2) Cystic Distension of the Lachrymal Sac; Operation on Nasal Duct in the Nose (West's Operation) 102

Brain, with large Pituitary Tumour, from Patient who died from Hæmorrhage after Partial Removal of Floor of Sella Turcica. By W. HILL, M.D. ... 103

By C. I. GRAHAM, F.R.C.S.
(1) Pituitary Growth 106
(2) Specimen of Cerebral Tumour which involved Pituitary Fossa; Microscopical Section 107

By T. JEFFERSON FAULDER, F.R.C.S.
(1) Extensive Granuloma of the Larynx in a probable Case of Early Phthisis 108
(2) A Cartilage of the Septum Nasi removed by Operation and showing a Circular Defect 109

By E. D. DAVIS, F.R.C.S.
(1) A Post-mortem Specimen of Laryngeal Tuberculosis 110
(2) Amputation of the Epiglottis for Tuberculous Ulceration 111

By HAROLD BARWELL, F.R.C.S.
(1) Case of Laryngeal Infiltration for Diagnosis 111
(2) Suppurating Mucocele of Frontal Sinus in a Boy, aged 12 112

Congenital Tumour of the Septum, probably Glioma. By FRANK ROSE, F.R.C.S. 113

Sarcoma of the Left Tonsil. By NORMAN H. PIKE, B.S. 114

By JOHN F. O'MALLEY, F.R.C.S.
(1) Tumour in the Left Maxillary Antrum 115
(2) ? Lupus of the Nose 115

By JAMES DONELAN, M.B.
(1) Congenital Syphilis with Intranasal Lesions 116
(2) Post-diphtheritic Adhesions of Soft Palate 117

Microscopical Section of Pedunculated Growth of Nose. By W. H. KELSON, M.D. 118

Cyst of the Tonsil. By T. B. LAYTON, M.S. 118

PAGE
A Man, aged 27, with Paralysis of the Right Vocal Cord and of the Right Half of the Palate (the Facial, Auditory, Glosso-pharyngeal, and Accessory Portion of the Vagus involved). By J. Dundas Grant, M.D. 118

Hæmorrhage into the Right Vocal Cord, the Result of an Accident at Football. By W. M. Mollison, M.C. 120

April 4, 1913.

Announcement 121

By Herbert Tilley, F.R.C.S.

(1) Steel Shawl-pin removed from one of the Hyparterial Branches of the Right Bronchus, where it had been Lodged for Ten Days ... 121

(2) An Instrument for Expediting the Examination of Embedded Tonsils 123

Cast of the Epithelial Lining of the Œsophagus, from a Case of $CHCl_3$ Poisoning. By G. N. Biggs, B.S. 123

Sarcoma of the Right Tonsil. By G. N. Biggs, B.S., and William Turner, M.S. 124

Cyst of Arytæno-epiglottidean Fold which has Burst Spontaneously. By E. A. Peters, M.D. 126

By James Donelan, M.B.

(1) Cyst on Epiglottis, with Symptoms suggestive of Œsophageal Stricture 127

(2) Post-diphtheritic Adhesions of the Soft Palate 128

An Unusual Case of Laryngeal Tuberculosis. By E. D. Davis, F.R.C.S. ... 130

Tumour and Microscopic Section from a Case of Papilloma of Soft Palate. By Walter Howarth, F.R.C.S. 130

Old Specific Laryngitis. By F. F. Muecke, F.R.C.S. 131

Carcinoma of Left Vocal Cord; Operation: Arrest. By G. Seccombe Hett, F.R.C.S. 132

Double Abductor Paresis and Stricture of Deep Pharynx and Upper End of Œsophagus, after accidentally Swallowing Glacial Acetic Acid in October, 1912. By William Hill, M.D. 133

May 2, 1913.

By William Hill, M.D.

(1) Nearly Complete Paralysis of Left Vocal Cord of Unexplained Etiology 135

(2) Skiagram of Aneurysm of the Arch and Descending Aorta of which Physical Examination of the Chest gave no Indication 136

By E. D. Davis, F.R.C.S.

(1) Notes of a Case of Left Recurrent Laryngeal Paralysis, probably due to Dilatation of the Left Auricle 137

(2) Left Recurrent Laryngeal Paralysis following Acute Endocarditis and Pericarditis 137

(3) Right Recurrent Laryngeal Paralysis 137

PAGE
Left Recurrent Laryngeal Paralysis. By CECIL GRAHAM, F.R.C.S. 138

Discussion on the Ætiology of Unilateral Paralysis of the Recurrent Laryngeal Nerve. Opened by F. DE HAVILLAND HALL, M.D.; Sir DAVID FERRIER, M.D., F.R.S.; and W. PERMEWAN, M.D. 139

Sir FELIX SEMON (p. 155)—Dr. WATSON-WILLIAMS (p. 158)—Mr. E. D. DAVIS (p. 159)—Mr. T. GUTHRIE (p. 160)—Dr. JOBSON HORNE (p. 160)—Sir STCLAIR THOMSON (p. 162)—Dr. DUNDAS GRANT (p. 163)—Mr. HERBERT TILLEY (p. 165)—Dr. DE HAVILLAND HALL (reply) (p. 167)—Sir DAVID FERRIER (reply) (p. 167)—Dr. PERMEWAN (reply) (p. 168).

June 6, 1913.

By HERBERT TILLEY, F.R.C.S.
(1) Case illustrating the kindly Effect of Time in obliterating the Scars of Extensive Incisions for Operation on the Frontal Sinus ... 169
(2) Adult Male with (?) Early Malignant Disease of Lower Pharynx and Upper End of Gullet... 169
(3) Symmetrical Swellings on Anterior Aspect of Arytænoids just above the Vocal Processes 171

Osteoma of the Nose in a Woman, aged 31. By H. LAMBERT LACK, F.R.C.S. ... 172

By H. J. DAVIS, M.B.
(1) Chart and Brief Notes of a Case of Cavernous Sinus Thrombosis following Left Tonsillitis in a Boy, aged 10; Fatal Termination in Eighteen Days 174
(2) Unilateral Paralysis of Left Cord, Tongue and Palate, in a Man, aged 49. ? Cause 177

By W. H. KELSON, M.D.
(1) Perforating Ulcer of the Palate in a Man, aged 63 178
(2) Lupus of the Gums and Pharynx in a Man, aged 40 179

Case of Laryngeal Disease presenting Atypical Features 179

By JAMES DONELAN, M.B.
(1) Double Paralysis of the Superior Laryngeal Nerves in a Man, aged 25, in the Course of Disseminated Sclerosis from Lead Poisoning ... 180
(2) Tonsil Forceps for holding the Tonsil during Excision or Enucleation 181

By DAN MCKENZIE, M.D.
(1) Sinusitis Exulcerans of the Frontal Sinus; Operative Trauma of the Dura; Recovery 182
(2) Death after Tonsillotomy 184
(3) Goitre with Severe Pressure Symptoms. ? Malignant 187
(4) Endothelioma of the Soft Palate in a Girl, aged 17 188

A Specimen of a Large Polyp growing from the Tonsil. By E. D. DAVIS, F.R.C.S. 189

An Unusual Condition of the Nasopharynx. By J. H. CONNOLLY, F.R.C.S. ... 190

PAGE

Malignant Disease of the Œsophagus; Complete Paralysis of the Left Recurrent Nerve. By E. A. PETERS, M.D. 190

Ulcer of the Pharynx. By H. A. KISCH, F.R.C.S. 191

By WILLIAM HILL, M.D.

(1) Recent Laryngeal Perichondritis with Stenosis 192

(2) Brain with Large Pituitary Tumour in situ 192

Tumour of Superior Maxilla. By WALTER HOWARTH, F.R.C.S. 193

Ulceration of Hard Palate on Right Side and Mass under the Tongue on Left Side. By W. M. MOLLISON, M.C. 193

Corrigenda.—On page 13, line 1 (title), for "abductor" read "adductor": on page 13, line 3 from bottom, for "abductors" read "adductors."

The Council think it right to state that the Society does not hold itself in any way responsible for the statements made or the views put forward in the various papers.

JOHN BALE, SONS & DANIELSSON, LTD., 83-91, Great Titchfield Street, London, W.

Laryngological Section.

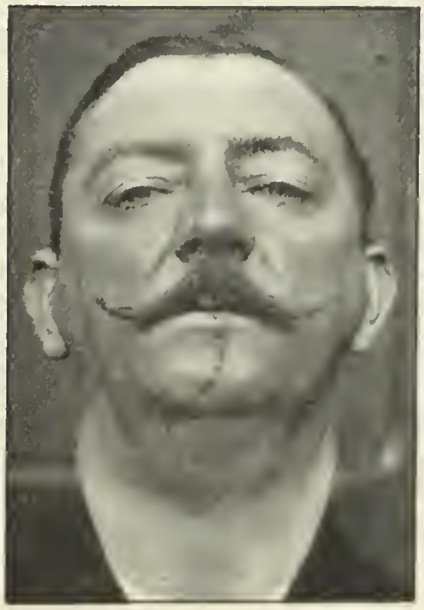
November 1, 1912.

Mr. HERBERT TILLEY, President of the Section, in the Chair.

Case of Mikulicz's Disease.

By JAMES ATKINSON, M.B.

MALE, aged 33, porter. Symmetrical swellings of both parotid glands. Submaxillary glands are felt to be distinctly swollen when examined between the fingers; lachrymal glands not visibly enlarged, but there is undue lachrymation. Glands are felt to be enlarged in posterior triangles of neck and in occipital regions. There is no pain or tenderness. The swellings of parotids first noticed ten months ago. The liver is much enlarged, but there is no enlargement of spleen to be detected. Patient is a little liberal in his allowance of alcohol.



Case of Mikulicz's disease.

DISCUSSION.

Dr. D. R. PATERSON said he had taken an interest in this disease from the time Mikulicz first described it, and the first case of it he saw in this country was one shown before the old Laryngological Society. He did not know that this present case could be so described, as there was only one salivary gland definitely symmetrically affected—namely, the parotid. The other salivary glands were doubtful and the lachrymal gland could not be felt. On the other hand there was considerable enlargement of the lymphatic glands of the neck. In the first cases of the condition described by Mikulicz the affection was confined to the secretory glands, and unless the conception of the disease had been extended this case would hardly come under that category.

The PRESIDENT (Mr. Herbert Tilley) said that Osler had described a case in which it was found after death that the lachrymal gland had become fibrous, and there had been a history of its enlargement earlier in the case. If it was thought that Dr. Atkinson's case was lymphadenoma the microscopic examination of a portion of the gland would enable such a diagnosis to be made. The effect of arsenic might be tried in this patient.

Mr. KISCH said the case was of interest because of the enlargement of the lymphatic glands. The disease was supposed to have some relation with lymphadenoma, but in most of the published cases no enlargement of glands was mentioned. In this case both submaxillary glands were enlarged.

Dr. ATKINSON, in reply, said there was considerable enlargement of both submaxillary glands, and also, he believed, of the sublingual glands. It was Mr. Kisch who suggested it was Mikulicz's disease, and he (the speaker) did not know what else to call it. The patient disappeared after the first time he was seen, and was seen again only a few days ago. The urine was normal, and there were no enlargements in the general lymphatic system of the body. He would try arsenic. No enlargement of the spleen could be made out either by palpation or percussion. The liver was much enlarged.

Fibroma of the Nasopharynx.

By HERBERT TILLEY, F.R.C.S.

H. C., AGED 21, applied to the Radium Institute last June in order that a tumour in the right nasal cavity should be treated by radium, because he had been told that the case was inoperable. Examination showed that the right nasal cavity was filled by a firm vascular mass which reached from the vestibule in front to the nasopharynx posteriorly, where it filled and slightly projected from the posterior choana. The patient was anæmic but otherwise his general health was fairly good.

The patient was admitted to University College Hospital, and was operated on by me. Preliminary laryngotomy was not performed as I hoped to be able to plug the post-nasal space securely with a sponge, but it was necessary to open the wind-pipe during the operation because of the severe bleeding and difficulty of administering the anæsthetic. Free access to the nasal fossa and the growth was obtained by turning up the right cheek and upper lip, and removing the ascending process of the maxillary bone. The tumour was very vascular although tough, and it grew from a broad base which appeared to include the posterior ethmoidal cells and lateral wall of the nasopharynx. It was removed by cutting close to its base with strong scissors, and partly by means of a strong wire snare which could be slowly tightened up. The bleeding was very free, and transfusion was employed when the patient was returned to bed.

He made an excellent recovery, and on one occasion I made four deep punctures with the galvano-cautery into what seemed to me a small recurrence in the base of the growth; this has disappeared, and since the patient is 21 years of age I do not anticipate further trouble.

The pathologist's report states that the growth was of a fibrous nature, contained large thin-walled blood-vessels, and in several regions cysts were situated, in some of which evidences of old hæmorrhages were present.

Specimen of Large Fibroma removed from Patient some Seven Years ago.[1]

By HERBERT TILLEY, F.R.C.S.

FOUR extensive operations were necessary, but the patient is to-day alive and well, and is a picture of robust manhood. The interesting feature in this case was the fact that a large portion of the tumour grew from the posterior wall of the antrum, and it was from this region that recurrences took place after the first operation.

---

[1] Vide *Journ. Laryngol.*, 1911, xxvi, p. 213.

DISCUSSION.

Dr. Watson-Williams said it required some enterprise to attack a bleeding fibroma, and Mr. Tilley was to be congratulated on his successful result. The growth was approached through the anterior route, and he urged that anterior routes, either by this method or by that which he had himself advocated—namely, splitting the nose and turning out an osteoplastic flap, with removal of the posterior part of the nasal septum—a method of approach which gave a very complete view and control of the area involved, gave more perfect access than the more usual splitting of the soft and partial removal of the hard palate. Sometimes one was inclined to overlook the advantages accruing from an anterior route.

Dr. FitzGerald Powell congratulated the President on the result of his case. Tumours such as this, which had probably their origin in the nose, and had not extended very far into the nasopharynx, were easily approached from the front by this method, but where the tumour was large, involving the basi-sphenoid, and, as in a case of his, extending along the pterygoid process, he thought it would be found necessary to perform an osteoplastic resection of the upper jaw or do the modified form of Nélaton's operation, splitting the palate and removing a portion of the hard palate if necessary. For a small tumour the method adopted by Mr. Tilley seemed to be preferable. Many of these tumours in the nose and nasopharynx showed malignancy, and he thought from the recurrence that there might be a sarcomatous factor in this case. The difficulties found and described by the President in performing the operation were an object-lesson, and very forcibly indicated the necessity for a preliminary laryngotomy, which should always be performed; it enabled us to control hæmorrhage, and assisted considerably the administration of the anæsthetic.

Mr. Harmer agreed that preliminary laryngotomy was good in these cases, and sometimes it was desirable to go further. In a case of very large nasal fibroma, which he reported some time ago to the Clinical Section,[1] which gave the patient a frog face and displaced both eyes outwards, the tumour was very vascular and pulsating, and several London surgeons pronounced it to be inoperable. He first did a laryngotomy, and temporarily ligatured both internal carotid arteries, and then the whole tumour was taken away, almost without bleeding. The arteries were gradually released afterwards, and bleeding points dealt with as they appeared. In such cases the question of temporary ligature should be considered.

Mr. E. D. Davis asked whether the growth was attached to the basi-sphenoid or the basi-occiput, as it was stated that fibromata arose from the perichondrium or the plate of cartilage between the basi-sphenoid and the basi-occiput, and that such fibromata did not recur after ossification of that cartilage about the age of 25.

---

[1] *Proceedings*, 1910, iii (Clin. Sect.), p. 122.

Dr. WESTMACOTT said he had had a similar case in a boy aged 16, in whom the growth originated from the posterior ethmoidal region. There was first enlargement of the inferior turbinal and some protrusion of the cheek, pointing to invasion of the antrum. On removing the turbinal he found a good deal of polypoid material in the antrum and in the middle turbinal region, which was cleared out. Five months later the patient returned with the nose filled by a solid mass, which was pink and shiny in appearance. He again operated. He usually had the patient's head hanging over the table, so that there was nothing to interfere with the anæsthetist, nor fear of blood entering the larynx. He found he could not remove the mass, as it was so hard and solid, and the hæmorrhage was so profuse; after getting away as much as he could with the snare and very strong scissors, he had to leave it. He saw the patient again only a few days ago, and found the nose was filled with a large single growth. There was slight protrusion of it into the nasopharynx, otherwise that part was clear. The question was whether he should do a formidable operation to remove it, or leave it alone.

Dr. D. R. PATERSON said he had been under the impression that fibroma originating within and confined to the antrum was a very rare condition, but this year, at the meeting of the German Laryngological Society at Hanover, he saw three specimens of fibromata of some size which Professor Manasse had removed from the interior of the antrum.

Dr. DUNDAS GRANT said that if these growths were attacked before they became very large, much could be done by passing a raspatory through the nares and detaching the periosteum from the bone, vigorously guiding by a finger in the pharynx. The growth could then be got away with much less hæmorrhage than might be expected. In a notable proportion of the cases exhibited at this Section the growths had their origin in the antrum. He had himself described one case in which it was possible, with the finger in the pharynx, to feel the adventitious opening in the inner wall of the antrum through which the mass protruded.

Mr. HORSFORD said it seemed agreed that preliminary laryngotomy was necessary in these cases, and he asked if the method had been tried which was known as the per-oral method. He had seen this used in Berlin.

The PRESIDENT, in reply, said he would not split the soft palate for such a case if he could gain good access to the growth otherwise. One obtained this through the nose by turning up the cheek by an incision in the gingivo-labial fold, and removing the ascending process of the superior maxilla and cutting through the floor of the nasal septum: the whole of those structures could be turned upwards, so that the tumour was fully exposed. In this case the microscope revealed no sarcomatous elements. With regard to preliminary laryngotomy, he made a mistake in this case, for he had thought he might manage without it, because the growth did not fill the nasopharynx on the right side, and that it would suffice to pack a sponge in tightly. But the bleeding was very free, and directly he began to manipulate the growth the hæmorrhage seemed to come from the whole surface rather than from any particular vessels. In the midst of the operation, as the boy was becoming faint, and there was difficulty in administering the anæsthetic, he put in a laryngotomy tube; he thought he would in future put one in first of all, even though it might prove afterwards not to have been necessary. Mr. Harmer's suggestion as to ligation of the carotids was valuable, but in the four cases of the kind he had had in twenty years he had not yet seen the need of that procedure. In this patient there had been a recurrence in the postero-lateral part of the nasal fossa, which had appeared in less than a month. During the past month he had punctured it on two or three occasions with the galvano-cautery, and already there was a distinct diminution in the size of the swelling. In reference to Mr. Westmacott's case, he suggested that he should try Voltolini's method, or electrolysis, for in America cases had been reported in which large growths had been cured by electrolysis and practically without any loss of blood. Or the galvano-cautery loop could be tried. In any future case of his own of this character he intended to try the galvano-cautery, as the experiences he had had with this class of case were very trying; this particular patient was so weak after the operation that it was thought wise to transfuse him. One might carry out Dr. Grant's suggestion in cases where the tumour was smaller, but he could not conceive it being practicable in such a case as he (the speaker) had shown to-day, for it would necessitate one working more or less blindly through the nasal cavity. He had brought the bottle specimen of another case of large nasopharyngeal fibroma, because it was in reference to this case that Dr. Bryson Delavan had made some very uncomplimentary remarks when speaking on this subject before the American Laryngological Association.[1] Dr. Delavan not only condemned the method of operation, but inaccurately recorded the history of this case, the operative details, and left the reader to understand that because there was no recurrence within three months the patient was therefore reported "well." As a matter of fact, the history was that the patient from whom this growth was removed was that day "quite well." He stood 6 ft. 2 in. in height, a picture of health, and was in the South African Police. The recurrence took place from that part of the tumour which grew from the posterior wall of the antrum, and when that was removed at the fourth operation no further growth took place. Dr. Delavan proceeded to say, "These few instances suggest first the absolute lack of knowledge shown by many operators of this type of case. Again they show the wretched manner in which reports of such cases are made. Nor is bad history confined to this country: some of the worst instances are to be found in foreign literature, especially the German." If Dr. Delavan could see these two patients Mr. Tilley thought he would wish that he had been less severe in his criticisms and had taken greater care to verify his references.

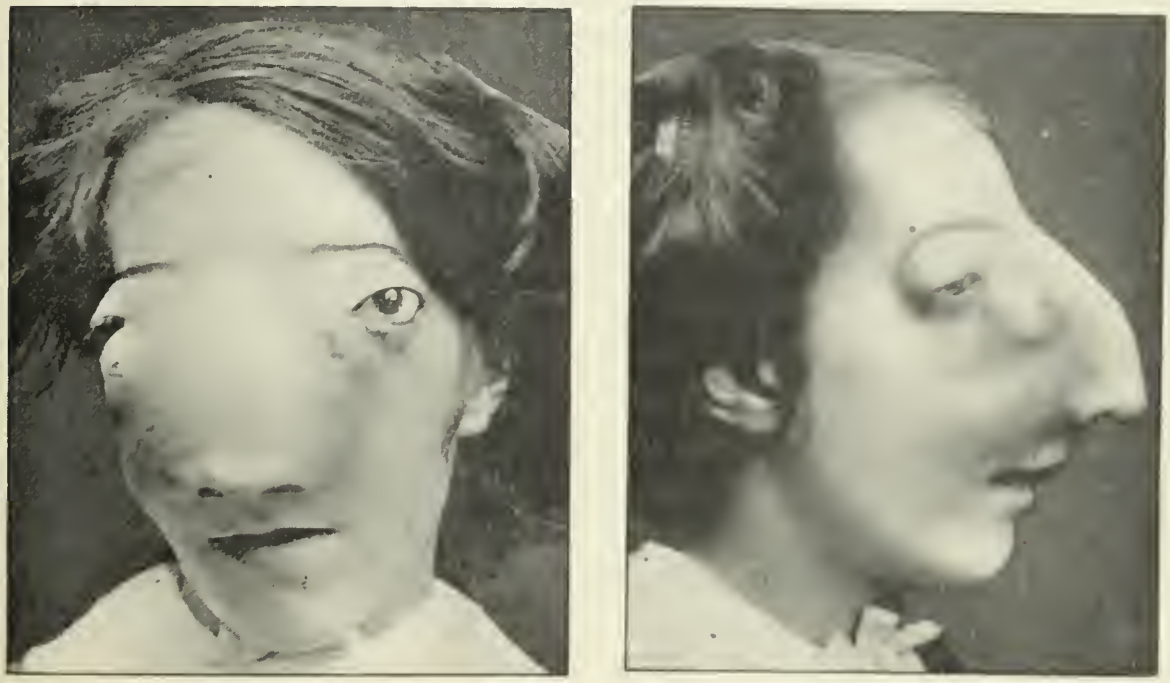
---

[1] *Vide* "Transactions of the Twenty-third Annual Meeting of the American Laryngological Association," 1911, pp. 16-17.

Photographs of a Patient suffering from a Chondro-sarcoma, originating in the Left Nasal Cavity.

By HERBERT TILLEY, F.R.C.S.

MISS I., aged 16, consulted me on July 7, 1910. Her only symptom was inability to breathe through the left nostril. Examination showed the left nasal cavity completely filled with a smooth firm growth which closely resembled a cystic enlargement of the middle turbinal. It reached from just within the vestibule to the posterior choana, and a probe could not be passed between it and the surrounding parts. Exploration showed that it was a solid growth. The antra were clear on transillumination. Septum much deflected to right. She was admitted into University College Hospital and the growth fully exposed by turning up the upper lip and left cheek and removing the ascending process of the left maxillary bone. Care was taken to try to remove the growth *in toto*, but it was very friable and of the consistence of a hard frozen ice-cream, and the site of origin could not be ascertained. Every trace of it was removed, and the patient rapidly recovered, but in a few weeks recurrence was noted.



Chondro-sarcoma of the nose.

During my illness Mr. Hett operated again and found the growth had penetrated the septum and destroyed some of the right ethmoidal region.

Recurrence again took place, and the patient consulted other surgeons, who did not advise operation.

The photographs were taken towards the end of July, 1912.

Two Cases of Bilateral Œdema of Nasal Septum.

By J. F. O'Malley, F.R.C.S.

Case I.—M. J. R., female, aged 20, cigarette-maker, came to hospital complaining of her nose getting broader and of her inability to breathe through it. The sense of smell was also absent. On examination polypi were readily seen on both sides, with a septal deflection to the left. She was admitted for operation, and on removal of the cocaine and adrenalin gauze packing the bilateral swellings on the septum were first observed. A submucous resection was done and the polypi removed. The latter are recurring, but the septal swellings remain practically the same size. The septal cartilage, bone, and periosteum were healthy, and the œdema was apparently limited to the mucous membrane. Transillumination shows good crescents on both sides.

Case II.—L. M., male, aged 11, came to hospital because his nose was getting broader and he could not breathe through it. He also complained of continual "colds in the head" and headaches, and gave a history of three years' duration. On examination, the left nasal fossa was seen to be completely blocked with a pale red, soft, mobile mass. It lies in the centre of the passage with a cleft on each side of it. A probe passed along the inner cleft is soon stopped against the base of the swelling on the septum, but the outer cleft is permeable. This can be seen under the use of cocaine and adrenalin. The condition on the right side is similar, only less pronounced, as the junction of the base of the swelling and septum can be more easily seen. The middle turbinates are small "flapper"-like bodies pushed up against the outer wall of the middle meatus. No polypi were seen during examination, but the condition under the middle turbinates has not been investigated. Transillumination shows good crescents.

DISCUSSION.

Mr. CLAYTON FOX said these cases might be placed in the same category as the condition frequently seen in large clinics—namely, œdema and hyperplasia of the tubercle of the septum. There was in such cases a large amount of glandular tissue, some lymphoid, and possible cavernous tissue present. The slighter cases could be dealt with by the galvano-cautery, and the more pronounced either by snaring or lateral incisions followed by gauze packing.

Dr. DAN MCKENZIE said those cases formed two further instances of a condition which was really due to ethmoidal disease. Last year he showed a similar case, in which there was œdema on both sides of the nasal septum; and this was not uncommon in ethmoidal suppuration. Probably the same cause which induced the polypi from the middle turbinal also produced the œdema of the upper part of the septum. In these cases the œdema seemed to be limited to the upper part of the nasal septum—namely, the bony part. He would like to have an explanation of this.

The PRESIDENT said he had a private case in which similar appearances were present, not only on the "tubercle of the septum," but there was a distinct prominence on the floor of the nasal meatus, very like a polypus growing from the nasal floor.

Denker's Operation for Maxillary Antrum Suppuration.

By DAN MCKENZIE, M.D.

GIRL, aged 19. Nasal discharge (right side) of over one year's duration. Usual signs of antrum suppuration. Pain in face over right antrum present. Denker's operation three months ago; cure. The essential feature of the Denker operation is the removal of the anterior bony angle of the antrum, so as to render continuous the openings in the canine fossa and in the nose. In this case the operation was performed through the mouth under chloroform. After-treatment is enormously facilitated by the ease with which the antrum can be drained and washed out; one can look straight into the antrum on anterior rhinoscopy.

There is a somewhat serious drawback to the operation. Cases have occurred (I am told) in which, subsequent to the operation, cicatricial contraction has induced displacement of the ala nasi on the operated side. There is no sign of deformity in the present case.

DISCUSSION.

The PRESIDENT said there were two reasons why this operation might not be the best for general adaptation. First, similar good results might be obtained by similar measures; and, secondly, he knew of one case in which stenosis of the lachrymal duct had occurred which necessitated probing of the duct for several months.

Dr. D. R. PATERSON said he had done this operation for some time, usually for growths in the nose. He had done it a few times for ordinary chronic suppuration of the maxillary antrum, and they had all done well, and with no resulting deformity of the ala.

Dr. MCKENZIE, in reply, said it did not strike him as a very large operation, but the incision had to be a little farther in front than usual. He kept below the inferior turbinal. The possibility of interference with the nasal duct was obvious, though he did not think it was greater in Denker's operation than in others. He desired to emphasize the question of deformity, as he had been authentically informed since this patient had been operated on that cases of displacement of the ala from cicatricial contraction had occurred; therefore he would not feel justified in performing the operation again.

Tuberculosis of the Tonsils and Cervical Lymphatic Glands.

By DAN MCKENZIE, M.D.

THIS little boy came under treatment for "enlarged tonsils and glands in the neck" about nine months ago. The tonsils were enucleated and examined for tuberculosis. The microscope showed plentiful giant cell systems in the left tonsil, with a few in the right. The lymphatic glands on the left side of the neck are more affected than those on the right. The patient is being treated by tuberculin.

The case is of special interest for two reasons: First, it exemplifies one of the two types of tonsil tuberculosis to which attention was drawn two years ago in a discussion at the Section, that, namely, of the disease in the substance (and not on the surface) of the tonsil; there is no ulceration; it is associated with enlarged cervical glands; and it occurs in a child. In the other variety the tuberculosis is ulcerative, superficial, secondary to pulmonary disease, and occurs in adults. The second point of interest is that the case emphasizes the importance of enucleating the tonsils when the cervical lymphatic glands seem to be tuberculous.

The President said he had seen a case where there were enormous tuberculous glands, and operation had been refused by a surgeon because extensive cicatricial contraction in the neck would ensue. Tuberculin was given for six or eight months, and the glands had practically disappeared.

A Simple Tonsillotome.

By James Donelan, M.B.

This tonsillotome has been designed by the exhibitor as an improvement on one introduced by him some fourteen years ago (also shown) which was a modification of the original instrument of Morell Mackenzie. This modification consisted in the removal of the upper of the two parts of the slit ring between which the blade finishes the cut. This slit was difficult to clean and often a cause of the more rapid deterioration of the edge from retention of imperceptible moisture. At the same time Mackenzie's rounded edge was given a pointed form. In order to diminish the much dreaded risk of the excised tonsil falling into the larynx a flange was added on each side of the lunette so as to grip the expanding edge of the cut tissue. It did this very well, but it was found in practice to be a superfluous precaution, as the tonsil was usually pinched by its capsule between the blade and holder, unless when the blade happened to be a little too sharp and cut through the posterior part of the capsule without holding any of its fibres.

The new instrument has been devised with the idea of getting rid of everything except the really essential parts. It consists, really, of only two portions if, as recommended, the handle be supplied as a fixture. The small screws, springs, and nuts of previous forms of the Mackenzie tonsillotome have been done away with. The resiliency of the blade and holder are availed of to give the necessary spring, and this is increased up to the end of the cut by making the back stop of the blade travel up an inclined plane. Two little studs act as a front stop, and these also serve instead of flanges to catch the excised tonsil by its capsule. The blade can be rapidly detached and the holder quickly and thoroughly cleaned. The handle has been fixed at the angle recommended by Dr. Kelson.

The tonsillotome shown is the middle one of the three sizes most commonly in use. It is the original working and trial model made up by the Holborn Surgical Company from an old instrument, and has, therefore, not so good a finish as those to be made of entirely new materials will have. It has, however, been thoroughly tested in several operations and has proved quite satisfactory.

Dr. J. Donelan said he had used it in twenty cases. It caught the tonsil very effectually when it was cut. It was not intended in any way in opposition to the modern revival of the operation by enucleation, but in the large majority of primary tonsillotomies, especially in children, he believed the old operation would continue to be practised, and that this instrument would be found to possess the merits claimed for it in the description given.

Epithelioma of the Soft Palate.

By Francis Muecke, F.R.C.S.

E. M., male, aged 44. Hard, warty, ulcerating growth on soft palate, situated just behind and above third left molar tooth of jaw. The size was slightly less than that of a threepenny bit. The edges were raised and indurated. History was indefinite; the ulcer had been noticed for about three months, and had caused a little pain. A small piece was removed for examination, and the report was: "Squamous and horny carcinoma in early stage." The anterior triangle of the neck was completely cleared, and all glands, including the submaxillary, were removed. A laryngotomy was then done for anæsthetic purposes, and the upper part of the pharynx plugged. The growth was freely and boldly removed, allowing about ¾-in. radius. Bleeding was profuse. The cut edge of the soft palate was approximated by stitches to cut edge of the anterior pillar, and the deep wound firmly plugged to prevent hæmorrhage. Next day the plug was removed, and no hæmorrhage resulting, the laryngotomy wound was closed; healing was rapid and satisfactory. Microscopical section shown.

I am greatly indebted to Mr. Hunter Tod for permission to show this case.

Double Abductor Spasm, caused by Vocal Overstrain (?)

By Francis Muecke, F.R.C.S.

A. L., male, aged 30. First seen in July last, when he came to the hospital with complete loss of the singing voice and painful and husky speaking voice. Onset was gradual. First noticed loss of high notes, then pain after singing, and then husky voice, till he had no voice whatsoever, the total process lasting seven months. He practised all the time most assiduously and all too frequently to try and clear a supposed obstruction. The method used was undoubtedly faulty, and the voice was forced beyond its natural limits. The laryngoscope showed the cords closely approximated in the middle line; they were curved, so that their anterior and posterior extremities almost touched; both cords were red and injected. No outward movement took place on deep breathing. Complete rest was ordered.

He has since been seen on five occasions, and the local conditions have altered somewhat on every occasion; sometimes very fair outward movement, sometimes very poor. The right cord has always been the better of the two, and on the last occasion the left appeared to have no movement whatsoever. He says he is enormously improved and that the speaking voice is now normal. No cause, such as aneurysm, &c., was found.

DISCUSSION.

Sir Felix Semon said he would ask Mr. Muecke to change the title of this case,[1] because he felt that any one reading of double abductor paresis caused by vocal overstrain would think a new kind of cause for abductor paralysis had been encountered. Probably all who had inspected this patient had found there was no disease at all, and that the vocal cords moved well outwards, as described in the second part of the notes. His own opinion was, not that abductor paralysis had been caused by the overstrain, but spasm, analogous to writer's cramp, due to overaction on the part of the abductors, and that in consequence of that perverse action the cords could at times not be abducted as well as they should be. This was an entirely different thing from abductor paralysis associated with organic disease.

---

[1] The original title given to this case was "Double Abductor Paresis."

Mr. MUECKE replied that he would certainly accept Sir Felix Semon's suggestion. He used the word "paresis," simply to indicate that there was no movement of the cords at the time, not to signify paralysis. He wrote the notes a month ago, and when the patient came a fortnight later there seemed to be a cure; he thought that was so now, and that any lacking movement was functional.

Tonsils and Cervical Glands removed Post Mortem from a Man, aged 47.

By A. R. TWEEDIE, F.R.C.S.

SECTIONS of the growths on both sides suggested an epitheliomatous infection. The specimens were submitted for confirmation of this latter point.

DISCUSSION.

The PRESIDENT suggested that the specimen might be referred to the Morbid Growths Committee, and this was agreed to.

Sir STCLAIR THOMSON asked if both tonsils exhibited epithelioma? He had had an analogous case, the growth being sarcoma, in a girl aged 17. Mistakes were made about it by several eminent men, because both tonsils looked so much alike. There were glands on each side, and the tonsils projected. They had been punctured. What attracted his attention was the hardness of the glands. He shelled out the tonsils under an anæsthetic, and they proved to be sarcomatous. The girl was now dying in the country.

Sir FELIX SEMON did not see why both tonsils should not be epitheliomatous from contact, as was sometimes seen in the case of the lips, or the vocal cords. One side might have been infected from the side originally infected.

Mr. HOPE remarked that two years ago, at St. Mary's Hospital, there was a man suffering from sarcoma cutis, and both his tonsils were found to be sarcomatous, as proved by removal and subsequent sectioning.

Cartilaginous and Fibrous Growth removed from a Girl, aged 18.

By A. R. Tweedie, F.R.C.S.

The site of origin was apparently the left Eustachian cushion or the area between the latter and the upper end of the adjacent posterior pillar. It occupied the greater part of the nasopharynx. (Sections exhibited.)

Mr. Westmacott said that five years ago he recorded a case similar to this. The growth was so large that its removal from behind the soft palate was difficult. The patient was a boy aged 12, and there had been no recurrence. It was a pure chondroma. It filled the whole nasopharynx, and was growing forward into the left nasal fossa.

Specimen showing (?) Ulceration of the Left Internal Carotid Artery from a Boy, aged 1 Year 8 Months.

By A. R. Tweedie, F.R.C.S.

The boy had been ill three weeks before with a "sore throat," from which he had been regarded as convalescent by his doctor for some four days. When first seen by the exhibitor there had been alarming intermittent attacks of hæmorrhage from the left ear for the last thirty-six hours, giving ground for suspicion of some aural lesion. There was no sign, however, of middle otitis or mastoid disease, but the left peritonsillar area was infiltrated and injected, and the parotid and submaxillary lymph glands were enlarged. An investigation under an anæsthetic was advised and carried out some two hours later when an urgent tracheotomy was required. After the patient had then recovered, on opening the mouth the left half of the soft palate was seen to be bulging markedly forward and a peritonsillar incision here evacuated about an ounce of blood-clot. As there was also a semi-fluctuant swelling behind the sternomastoid, an incision was made here too, and the resulting cavity found to communicate with both the peritonsillar and retropharyngeal spaces. The patient's condition did not admit of more than merely packing this wound with gauze, and in spite of all attempts he died about half an hour later.

Post mortem: An "ulcer" was found in the internal carotid immediately below the base of the skull, the adjacent lymph glands were enlarged, but no naked-eye sign of pus could be seen. The bleeding had reached the external auditory meatus via a fissure of Santorini. The middle ear was intact and healthy.

Dr. WATSON-WILLIAMS said he was reminded of a case several years ago at the Royal Infirmary, Bristol, that of a boy who was to have been operated upon for adenoids the following day: but the patient, almost suddenly, died from copious hæmorrhage. It showed how dreadful a position might arise if one operated for adenoids without being aware of this condition. He believed in that case the trouble was due to a breaking-down tuberculous gland, which seemed to have opened the carotid artery.

Epithelioma of the Larynx in a Man, aged 28.

By Sir StCLAIR THOMSON, M.D.

A MICROSCOPICAL section from the case shown by Dr. Noel Bardswell on May 3, 1912.[1]

When this patient was shown in May last he was examined by several members, but no one suggested malignant disease. Sir Felix Semon said he did not think that a diagnosis was then possible. An exploratory laryngo-fissure was started, and the cartilage was found to be replaced by a malignant growth. No operation was possible. In the *Proceedings* of the Section for March 1, 1912, p. 93, will be seen the report on an epithelioma of the larynx removed post mortem from a man, aged 23. That I should be able to show two cases of epithelioma of the larynx within three months, in patients aged respectively 23 and 28, gives rise to the suggestion that malignant disease is becoming more common in early life.

Two Cases of Radical Frontal Sinus Operation (Killian).

By Sir StCLAIR THOMSON, M.D.

THESE two cases are shown (1) on account of the severe headache which impelled the patients to seek relief at any risk; (2) to illustrate the very satisfactory cosmetic result; and (3) to show the complete cure of suppuration.

---

[1] *Proceedings*, 1912, v, p. 151.

Case I.—Mr. R. C. K., aged 30, is a trooper in the South African Police. For nearly six years he had a discharge from the left nostril, with such severe left frontal headaches that he came to England with the determination, as he himself expressed it, to either get cured or put a bullet through his head. In July radical operation was carried out on his left frontal, ethmoidal, and maxillary sinuses. He returns to South Africa this month completely relieved of all headache, and with marked restoration in general health.

Case II.—Mrs. A. T. This patient was also operated on in July. She is a hard-working woman from the country, and begged for relief, although warned of possible risks of the operation. Operation on the right maxillary sinus failed to relieve her, and a complete Killian was therefore carried out on the right frontal sinus. She has been absolutely relieved of all trouble of headache and discharge.

Photographs and skiagrams further illustrate the conditions.

DISCUSSION.

Dr. D. R. PATERSON asked whether Sir StClair Thomson had anything to add as to the method of dealing with the wound in these frontal sinus cases. His own practice recently had been to leave the eyebrow wound open for a week, making a secondary suture a week later. There was perhaps not such a fine linear scar then, but still some months afterwards the scar was hardly noticeable.

Dr. WATSON-WILLIAMS suggested that paraffin injections might be used in such cases. Formerly he had used injections rather too early, before the tissues over the depression became quite lax. But in one case so treated, in which the patient stayed away for a year before coming again, the effect of the injection was admirable.

Dr. DONELAN, discussing the question of leaving the external wound open, said it was of course possible, even a considerable time afterwards, to do a plastic operation and bring the edges into nearly perfect apposition. With regard to paraffin, though it was often talked about he did not himself attempt to use it in frontal cases. From his experience of it in other deformities he thought that, perhaps after a long interval, injections of the variety that could be used cold by means of a syringe, such as that of Alexandre, would probably be found safest and likely to yield the best results.

Dr. DAN MCKENZIE said the reason for leaving the wound open was that it was dangerous to close it, and Killian was one of those who had pointed that out, saying that it might induce osteomyelitis. The difficulty connected with subsequent suturing could be overcome by inserting the sutures at first, and not tightening them until later.

Mr. HOPE said that in one case in which a depression occurred it was made to disappear by massage alone; and there was now none to be seen.

The PRESIDENT agreed that the external wound should be left open. A few days since he had operated on a large right frontal sinus, in which he employed Killian's method. He sutured the outer part of the eyebrow, and put one suture above the internal canthus. One would prefer to sew up immediately, because of the "bridge" of bone which, if it became dry from exposure, might become necrosed. The experience of most men showed that to close a frontal sinus wound at the time of operation was risky; he had lost two cases by doing that, and he believed it was the cause of osteomyelitis of the frontal bone—e.g., there was obstruction to free drainage. If infection elements got into the diploë, he did not know any means of saving the patient's life, whereas if the wound was left open one could inspect the parts, and provide free drainage. When using paraffin injections there was often a chance that something might go wrong. He had not seen many cases in which paraffin injection had been a success; here it would have to be injected deeply. He had spent one and three-quarter hours in dissecting paraffin out of a region which had been injected by a "beauty specialist," and from whence it had spread to neighbouring regions, making the lady such a horrible sight that she had not been outside her garden gate for four months. The paraffin used was semisolid.

Sir STCLAIR THOMSON, in reply, said it was news to him that Killian now kept the frontal sinus wound open in all cases. His own recent cases he had closed, as he found as much danger from leaving them open as from closing them. In some of the former cases there had been reinfection of the wound. Moreover, there was anxiety about the bridge. The question of closing the wound depended largely on whether one was certain of having got into all the little galleries, especially the fronto-ethmoidal, behind the bridge; if so, then closing of the wound he regarded as a distinct advantage, not only from the æsthetic standpoint, but because he believed in keeping up pressure; he kept a firm pad above the bridge, and another underneath, and pressed these parts in a direction as if they were to meet. He thought frontal sinus operations were not now done as often as formerly, but that they were now done better; he did not have the same anxiety at the present time which he had in former years in these cases. In unhealthy subjects, in whom the material was fetid, he left a drain at the outer angle, and watched for puffiness. The question of the use of paraffin injections came up periodically at the Section. There was certainly some slight deformity resulting, but not disfigurement; he doubted if even a Bond Street "beauty specialist" could improve this depression. In a year the deformity would be scarcely visible. Members who used paraffin should show photographs before and after.

Malignant Disease of Left Sphenoidal Region; Proptosis with Blindness of Eye on same Side; Enlarged Cervical Glands on both Sides.

By HUNTER TOD, F.R.C.S.

MALE, aged 52. A year ago noticed bulging of left eye, and that sight was beginning to fail. Was seen by Mr. Lister, who found there was optic atrophy, and considered the cause might be a growth originating behind the orbital cavity. As there was also considerable headache, and slight nasal obstruction on the same side, the patient was sent to me. Multiple polypi were found within the nose, and also the middle turbinate was enlarged, and a slight amount of mucous pus could be seen by posterior rhinoscopy in the region of the superior meatus.

It was decided to explore the sphenoidal sinus in case this might be the cause of the ocular symptoms, although the proptosis could not be explained by the mere presence of suppuration within the sphenoidal sinus. On removal of the middle turbinate the sphenoidal opening could be seen, and its anterior surface appeared normal. On removal of the anterior wall no pus could be seen, but the interior of the sinus seemed red instead of the normal white appearance. On probing the posterior wall it appeared soft, so much so that malignant disease was suspected, although nothing definite could be discovered. The patient soon left the hospital (April, 1912), but returned two weeks ago.

The proptosis is still about the same, but there is complete blindness. A growth can be seen springing from the sphenoidal region, and enlarged glands can be felt on both sides.

The case is of interest in that proptosis was the first sign of the growth. The complete absence of headaches and neuralgia may perhaps be accounted for by the relief of tension due to the early removal of the anterior wall of the sphenoidal sinus.

DISCUSSION.

Mr. TOD said that no microscopical sections had been made. There was no bleeding, except on probing. He would be glad to know whether any treatment could be applied.

The PRESIDENT considered that operative treatment was out of the question in the case, and, unfortunately, radium, even in large doses, was of no use in squamous-celled epithelioma.

Marked Infiltration of Ary-epiglottic Fold and Ventricular Region of Right Side of Larynx, together with Partial Fixation of Vocal Cord.

By HUNTER TOD, F.R.C.S.

MAN, aged 30. Hoarseness, which was first noticed seven months ago. No pain, and no loss of weight. Chief trouble is attacks of spasmodic coughing, worse at night. ? Diagnosis.

DISCUSSION.

The PRESIDENT thought the right cord was not regular, and the appearance suggested tubercle. He understood that tubercle had been discovered in the lungs since the case first came under notice.

Dr. DUNDAS GRANT said that unilateral limitation when present in tuberculous disease was apt to trip one up in diagnosis, but he had seen several cases of it recently. In one, that of a lady, there was extensive growth confined to one side of the larynx; it was so completely unilateral that it could scarcely be believed that it was tuberculosis; it looked more like gumma or malignant infiltration. The microscope revealed its tuberculous nature. Members might remember a case of erroneous diagnosis which he brought before the Section. His primary diagnosis was tubercle, but this was thought to be contraindicated by the curious microscopical appearance. It turned out, however, to be tubercle.

Tertiary Syphilis and Ulceration of Larynx, causing Laryngeal Obstruction, treated by Neo-salvarsan.

By HUNTER TOD, F.R.C.S.

WOMAN, aged 38. Three weeks ago hurriedly admitted into the hospital in order to have tracheotomy performed for laryngeal obstruction. Symptoms not being urgent, tracheotomy was not performed, but some relief obtained by giving an injection of morphia, ice to suck, and cold compresses to neck. On examination the whole larynx looked red and congested, the vocal cords appearing as fleshy bands. Extending below the vocal cords, chiefly on the left side, was a large ulcer with a sloughy base. Two days after admission 0·9 grm. of neo-salvarsan was injected into the vein in the arm. This was repeated three days later. Within twenty-four hours after the first injection there was decided relief. The ulceration is healing rapidly, and is now very slight in comparison to what it was. The rapid action of neo-salvarsan is obviously a matter of importance in such cases, especially as a means of avoiding tracheotomy.

DISCUSSION.

The PRESIDENT considered it a very good result, and it was valuable knowledge that tertiary ulcerations might get well so quickly by this method. If one gave iodide of potassium in these cases, one must be prepared for swelling of the soft parts of the larynx, which might need a hurried tracheotomy.

Mr. WAGGETT said, apropos of the curative effect of salvarsan, that he had a case in which the patient had a syphiloma in the larynx so large that tracheotomy seemed necessary. After one injection of salvarsan it cleared up in a few days. The patient refused a second injection and the mercurial treatment suggested. That occurred a year ago, and he returned recently with the larynx quite well, but with a large mass of glands in the neck.

Dr. FITZGERALD POWELL said that some time ago this question was discussed at this Society, when some specialists from Aix-la-Chapelle were present and gave their opinion. It was generally admitted that in some cases initial improvement took place from the injection of salvarsan, but that it was found absolutely necessary to continue the use of iodide and mercury, or mercury, by injection or inunction; that he thought was the experience of most people — it was certainly his. It must not be forgotten that danger to life attended the injection of this drug, and the patients should be informed of the risk and possibilities of the treatment.

Dr. DONELAN said that a large number of cases of syphilis had now been treated with salvarsan at the Italian Hospital. At least two injections were always given. Recurrences were now coming in, some of them as early as six or eight months from the time of the injections. The already large mortality from heart failure, acute arsenical poisoning and other symptoms reported by so many authorities should not be lost sight of when selecting it in preference to mercurial inunction. At the same time there would always be urgent cases like the present in which its rapid, though apparently somewhat temporary action, would prove of the highest value.

Dr. D. R. PATERSON was able to confirm the excellent results from salvarsan in cases of syphilitic laryngeal stenosis. He had seen rapid disappearance after one dose. One case occurred eighteen months ago; the patient had since been on iodide and mercury, and there had been no recurrence.

Mr. Tod replied that he was glad that the President had mentioned treatment by iodides. He agreed with the President that the giving of iodides by causing œdema, often increased the obstruction, and necessitated tracheotomy. It was the rapid and beneficial action of the neo-salvarsan and the avoidance of the internal administration of iodides which he wished to bring before the notice of the Section.

Faucial Mucous Tubercles, Hunterian Sore on the Back of the Neck.

By H. J. Davis, M.B.

Woman, aged 25, with faucial mucous tubercles. The primary Hunterian sore is in the middle of the back of the neck. She attributes this to scratching herself with a comb. The patient is six months pregnant. Husband healthy.

Photographs showing primary lesion and large collar of glands exhibited.

Enlarged Tonsils. (?) Lympho-sarcoma or Lymphadenoma.

By H. J. Davis, M.B.

Woman, aged 38, with large ragged tonsils. There is a large indurated mass of glands in the side of the neck. She states these have been there for four years. The case is either one of lympho-sarcoma or lymphadenoma.

DISCUSSION.

Dr. Davis said he had had a further report that the Wassermann reaction was positive: but the case did not look to him like one of syphilis. There was a tumour behind the palate, but he did not know what was the cause of the enlargement of the glands.

Dr. Dundas Grant said it seemed to him that the tonsil on the right side was not so much enlarged as pushed inwards by the glandular mass; he thought this might be a condition altogether independent of that of the tonsil.

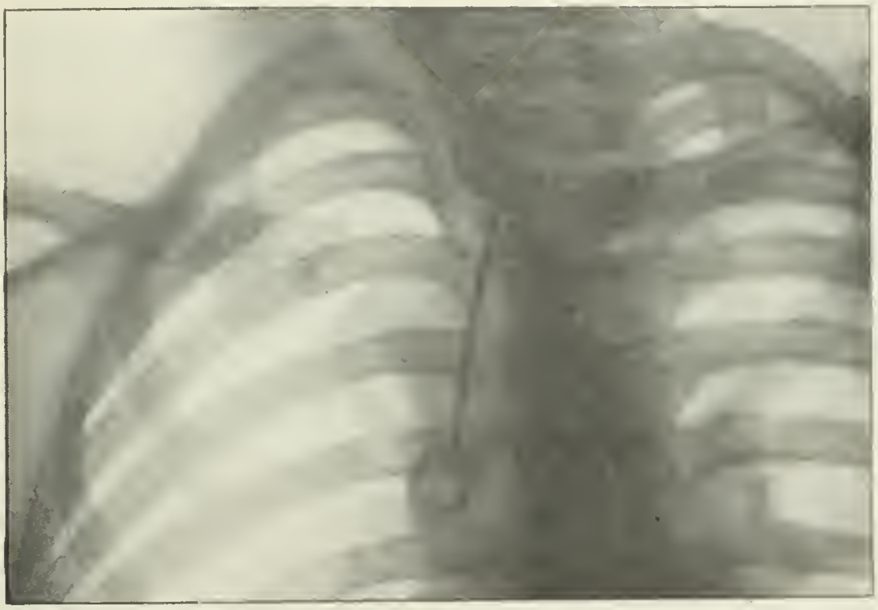
Dr. Dan McKenzie said he had had the same idea as Dr. Grant, that the tonsils did not look as if they were seriously diseased.

Dr. DAVIS replied that the tonsils had now cleared up very much, but they had been white with secretion. Since Mr. Tyrrell Gray advised him to give iodide of potassium and mercury they had cleared up. If it could be managed, he would take a portion of the gland away for examination, and he hoped to show the case again.

Skiagram showing a Butcher's Wire Skewer in the Right Secondary Bronchus of a Girl, aged 8.

By H. J. DAVIS, M.B.

THE skewer, 2¼ in. in length, was exhibited. It had been in the lung seven weeks, and owing to the point being upwards it was very difficult to extract. The child was very ill with broncho-pneumonia (unilateral), but rapidly recovered when the foreign body was removed and was now perfectly well.



Wire skewer in the right secondary bronchus (skiagram by Dr. Morton).

DISCUSSION.

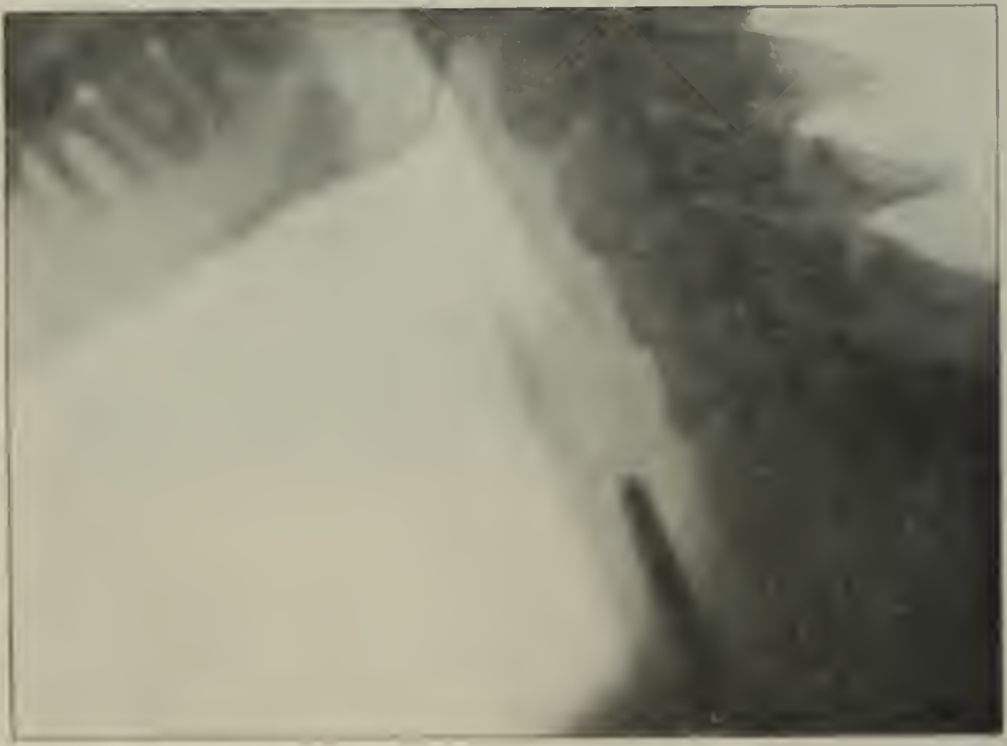
The PRESIDENT said Dr. Davis's patient reminded him of the well-known case reported by Dr. Brünings, in which a carpet nail was impacted head downwards in the bronchus, and was only removed after nine attempts at extraction. Dr. Brünings invented and described a special instrument for dealing with this class of foreign body. He suggested that sometimes it would be advantageous to use the X-rays at the time the surgeon was operating, so that he could be informed when the forceps were near the foreign body. He had worked thus himself, and found the combined method a great help.

Dr. D. R. PATERSON called attention to a simple method of masking the point of a pin directed upwards. When he had to remove a safety-pin which was open and had the point directed upwards, he passed a fine metallic tube over the point, and with that in position he caught hold of the safety-pin by the other limb and removed it.

Skiagram showing a Penny Coin impacted in the Œsophagus of a Woman, aged 25.

By H. J. DAVIS, M.B.

THE coin was exhibited, with two grape-skins, which were removed by œsophagoscopy, and were lying over the foreign body, obscuring its view. The patient had been unable to swallow anything for four days. The coin was firmly held by the œsophagus and it was not easy to remove as the jaws of the forceps kept slipping off.



Penny coin impacted in the œsophagus (skiagram by Dr. Morton)

DISCUSSION.

The PRESIDENT said he had experienced how easily a coin might slip from smooth-edged forceps, and he thought the best way to remove such a body was with the old-fashioned coin-catcher, though it should be used under the guidance of the direct method.

Dr. IRWIN MOORE pointed out that the difficulty which Dr. Davis had experienced in this case in grasping and holding the coin with Brünings's forceps could be obviated by the use of the strong œsophageal forceps which he (Dr. Moore) had designed and introduced for removing foreign bodies with Brünings's tubes. With these forceps one could get such a firm grip of any foreign body, whatever its shape, that once seized it was next to impossible to lose hold of it. A child holding a coin grasped by these forceps could be pulled round a room without the forceps giving way or loosening their hold.

Sluder's Guillotine.

By H. J. DAVIS, M.B.

THIS pair of tonsil guillotines, the only two sizes made, were presented to me by Dr. Sluder, of St. Louis, U.S.A. The instrument is his own and well known, and is designed for enucleating tonsils, however large, or however small, whether buried or not. The method has been already described. The blades must be blunt, and as the tissue external to the capsule is difficult to cut through, Dr. Sluder has invented this "mechanics dog," which enables the blunt blade to crush through any resistance; by the aid of the "dog" a piece of silk or wool can be easily severed. The instrument is very strong and takes to pieces easily and rapidly; it is made by Müller, of Chicago. I have used it several times, and it answers the purpose which the inventor claims admirably.

Dr. WATSON-WILLIAMS promised to show at a subsequent meeting a tonsillectomy instrument which he had devised some time ago, and which utilized the grasp of the hand instead of the weaker thumb, a principle that had been utilized by others. For tonsillotomy he had seen no instrument more ingeniously constructed than that now shown by Dr. Donelan.

Case of Pansinusitis.

By P. Watson-Williams, M.D.

This was a case of pansinusitis, in which the double frontal sinus suppuration had been practically cured by intranasal operations, particularly removal of fronto-ethmoidal cells, followed by lavage, together with double intranasal radical antral operations, and partial removal of ethmoidal cells and opening up of sphenoidal sinuses.

The patient was a solicitor, aged 54, who, in 1907, had become very depressed, and carried on his profession with very grave difficulty. He had suffered from a red swollen purplish nose since boyhood, and the doughy, pitted, purple-veined nose was a distinct disfigurement. Sinusitis was probably determined originally by a septal deflection, but when the patient was first seen it had extended to all the accessory sinuses. He was to-day a quick, busy solicitor with a large practice in London, and had completely lost his depression and aprosexia. He was shown now, four years after the last operation was performed, to illustrate the advantages of *not* operating by radical external methods in cases where intranasal operation relieved symptoms and gave good drainage.

DISCUSSION.

The President said this was an illustration of the present-day practice of thoroughly draining the suppurating lower sinuses and curing the upper sinuses by irrigation and free drainage. This man was at work, and full of intelligence and alertness, whereas mental concentration was impossible before the suppuration in the sinuses had been cured.

Dr. Watson-Williams replied that he wanted to emphasize his belief as to the possibility of getting extensive frontal sinus suppuration if not cured, at any rate ameliorated in a large proportion of the cases without any external operation, which latter he only performed when driven to it.

Infiltration of Uvula, Epiglottis and Arytænoids.

By C. W. M. Hope, F.R.C.S.

F. M., MARRIED, aged 30, four children. Resident in Norway seven years. For the last twelve months noticed some hoarseness; also a gradual thickening of lips. Has had two seizures; one before and one after third pregnancy. Examination shows solid white swelling of uvula, spreading on to soft palate; same condition of left arytænoid; epiglottis, both ary-epiglottic folds, and slightly also of the right arytænoid. Cords are free. Palate is *not* anæsthetic.

[*Addendum.*—Since showing the case the Wassermann reaction has been done; it is positive, and 0·6 grm. of salvarsan has been given. A second dose will be given next week.]

DISCUSSION.

Dr. DUNDAS GRANT said the case presented some features suggestive of myxœdema, either general or limited. The patient said her face had now become fatter than before. The thyroid gland was scarcely perceptible. There was no ulceration, and it would be interesting to know if any further signs of hypothyroidism were present. In any case treatment by thyroid extract might be tried.

Mr. E. D. DAVIS said that two or three years ago he saw a case with much the same appearance (at the Bergen Lazarette), and in that case as well as in this the pharnyx was anæsthetic. There was some œdema of the epiglottis and the arytæno-epiglottidean fold, but the nose was normal. The patient came from Christiania. He thought that further investigation might prove it to be a case of leprosy.

Mr. HOPE replied that he also had thought of leprosy, but the case had not yet been fully gone into. The patient would be brought again later.

Case of Atrophic Rhinitis, showing several unusual Features.

By CYRIL HORSFORD, F.R.C.S.

PATIENT, female, aged 21 (under the care of Dr. Abercrombie). Well-marked atrophic rhinitis on both sides, with enlarged middle turbinals which have fused together anteriorly through a large perforation in the cartilaginous portion of the septum. Trouble with nose dates from childhood. Both antra dark on transillumination, but when washed out are found to be empty. Some evidence of congenital syphilis observed in rhagades on upper lip. Complete occlusion of right auditory meatus with formation of adventitious drum. Early stage of similar condition in left ear—namely, chronic suppurative otitis media and narrowing of left auditory meatus.

The PRESIDENT said that perforation in itself did not suggest syphilis; it might be caused by trophic changes, such as one frequently saw in the so-called "idiopathic" perforations.

Laryngological Section.

December 6, 1912.

Mr. Herbert Tilley, President of the Section, in the Chair.

A Belated Sequel to a Successful Operation.

By Herbert Tilley, F.R.C.S.

Increasing difficulty of breathing and stridor caused by inflammation of the larynx, set up by suppuration around a necrosed portion of the cricoid cartilage. Fifteen years previously the patient had been successfully operated upon by Sir Felix Semon for epithelioma involving the anterior region of both vocal cords.

Admiral C., aged 73, consulted me some two months ago for increasing difficulty in breathing and some pain on swallowing. The stridor was well marked, especially after exertion or coughing. Laryngoscopy revealed a very narrow glottic aperture surrounded by intensely congested cicatricial tissue. Pressure over front of larynx produced some pain. Below the right edge of the glottis a pale granulation could be seen.

On November 20 I opened the trachea and inserted a tube, and then split the larynx to ascertain the cause of the stridor. A very fetid slough was seen on the inner aspect of the cricoid, and on curetting it the piece of necrosed cartilage (exhibited) was removed. Recovery has been rapid and uneventful.

The exhibitor believes that such a sequel is unique, and reports the case to emphasize that complications following thyrotomy from malignant disease are not necessarily due to recurrence of the original malady.

ERRATUM.—Mr. Muecke's case shown at the last meeting, see *Proceedings* (December, 1912, vi, No. 2), p. 13. The title of this case was, in error, stated as "Double Abductor Spasm, caused by Vocal Overstrain (?)," whilst in the discussion Sir Felix Semon has been made to say that spasm had been present "due to over-action on the part of the abductors." The title of the communication should have been: "*Double Adductor Spasm due to Overstrain (?)*," whilst Sir Felix Semon in reality spoke of spasm "on the part of the *adductors*."
—Editor.

DISCUSSION.

Sir Felix Semon said there was nothing special about the original malady of the patient, who was then aged 58, and had malignant disease on the anterior parts of both vocal cords. He performed thyrotomy and curetted the parts, and there was an uneventful recovery. The sequel to the thyrotomy performed fifteen years previously, in his experience, certainly was unique. One knew that sometimes a sequestrum, or foreign body, might remain impacted for many years without causing trouble, and then suddenly, without obvious reason, might assume activity, migrate from its original site, and cause trouble elsewhere. The case taught that, even at very late periods, every swelling within the larynx after such operations did not necessarily represent a recurrence of the original disease. With regard to early after-events, a fact to which he had repeatedly drawn attention, and which now met with general notice, was that, if in the scar of a thyrotomy wound a new little tumour made its appearance, one should not at once rush to the conclusion that it must be a recurrence of the original disease. On the contrary, it would be almost universally found that it was only a granulomatous tumour, and if that tumour were removed by forceps from within, it disappeared entirely. It might reappear, but after another removal there was hardly ever a further recurrence. The seat of such granulomatous tumour was either in the scar itself of the former growth, or the anterior commissure of the vocal cords, due to the suture of the thyroid cartilage after the operation. He hoped as much publicity as possible would be given to the case, as it might spare many a patient an unnecessary repetition of the operation.

Dr. Dundas Grant said he had had a similar experience to that which Sir Felix Semon described, and it was disconcerting unless one bore in mind that it was not unusual for granulations to form on the re-entrant angles of the thyroid, and speedily disappear under the applications of chloride of zinc. The illustrations to the paper which Sir Felix Semon brought before the International Congress at Budapest showed the condition very well.

The President (Mr. Herbert Tilley), in reply, said that that very morning he had performed thyrotomy for malignant disease, and when his assistant asked whether he would not put in a stitch to fix the sides of thyroid cartilage, he replied that he preferred a small stitch outside and over the front of the thyroid cartilage. In his earlier experiences of the operation he had had anxiety on account of the granulations which formed round the stitch when this passed through the cartilage of the thyroid, and had been disappointed when the patient came back at the end of two or three months with a papillomatous mass in the anterior commissure, which he feared might be a recurrence. This occurred in the patient whose larynx he showed before the Section[1] three years ago, and who lived thirteen years after the primary operation, and then died with a recurrence, or a new growth on the opposite vocal cord. Therefore he now preferred to stitch the perichondrium and the soft tissues at the sides of the thyroid cartilage and draw them just tight enough to keep the thyroid cartilages fixed for a few days until they were secured by the natural inflammatory exudation.

---

[1] *Proceedings*, 1910, iii, p. 33.

Very Large Tonsil in an Elderly Patient reduced almost to Complete Disappearance by Galvano-puncture.

By HERBERT TILLEY, F.R.C.S.

THE Rev. E. S. D., aged 68, consulted me on March 26 last for "an accumulation of matter in the nose," which he felt he could not get rid of; "increasing deafness in the left ear for past few weeks," and alteration in the voice as if he "had a quinsy." These symptoms had developed during the past six months previous to his visit to me. The left tonsil was so swollen that it almost touched the right fauces, and extended downwards beyond direct vision below the level of the epiglottis. It was not inflamed nor ulcerated. No enlarged cervical glands. I punctured it deeply in three places with the galvano-cautery. Three weeks later an extraordinary reduction in size was noticed. Similar treatment has been applied on three or four occasions since then, and, with the exception of the lower pole of the tonsil, the gland has almost entirely disappeared. The marked deafness in the left ear has also almost vanished, so that it is now his better ear. The galvano-cautery appeared to initiate a rapid absorptive effect on the tonsil, rather actually to destroy its tissue and replace it by a smaller fibrous mass.

DISCUSSION.

Mr. TILLEY said that in these days, when no enlarged tonsil seemed safe from surgical interference, he thought it was well to exhibit a type of case in which it was possible to obtain almost total abolition of the symptoms by measures simpler than radical surgical procedures. He at first thought the patient might have some form of new growth in the tonsil. As he was elderly, the question of enucleation was postponed as long as possible. He had not cauterized the tonsil through its lowest pole. The patient was now quite comfortable, his hearing was better, and unless there was urgent reason for more to be done, he proposed to rest content. A fortnight after making the first three punctures that part of the tonsil which had been cauterized had almost entirely disappeared.

Dr. DE HAVILLAND HALL said he had occasionally used the galvano-cautery for enlarged tonsils. He mentioned, in one case particularly, that of a fat, flabby lady, aged 40, the anæmic type of patient who looked bluish. She had huge tonsils, which were a serious inconvenience to her. The treatment occupied six weeks, and resulted in great diminution in the size of the tonsils. He lost sight of her for a year, then she reappeared and had another course. Five years later she presented herself for inspection, and there was no vestige of tonsil visible. It was for patients who were getting on in years, and in whom there was a liability to serious hæmorrhage, that the cautery was a great advantage.

Dr. KELSON said that, supposing the swelling was solid, not cystic, the case was of great interest, as it illustrated something in physiology which was often overlooked—namely, the power possessed by the galvano-cautery to cause absorption. In hypertrophic rhinitis, when the galvano-cautery was applied, a great deal more room was often produced than could be expected from either the slough separating, or from cicatricial contraction.

Dr. WATSON-WILLIAMS pointed out that both enlarged tonsils and adenoid growths were examples of lymphoid hypertrophy in response to infection: the rapidity of such infective hypertrophy was exemplified by tonsils in acute conditions undergoing marked enlargement. The benefit of the cautery was probably due largely to its action on the invading micro-organisms: (*a*) directly, when it was probably much the same as the ancient form of applying burning irons to wounds as an antiseptic; and (*b*) from the indirect effect of the inflammatory reaction set up. He took it that the condition in the patient shown was a subacute one, in a not very fibrous tonsil. In patients in whom the more rapid method of the usual operation was contra-indicated cauterizing was very efficient.

Dr. FITZGERALD POWELL said that no doubt most of the members had treated enlargement of the tonsils with the galvano-cautery—usually, he thought, with the surface cautery. It was a tedious, painful process, and required a number of sittings. In this case galvano-puncture had been used with great success, and it was a very useful method of treatment where, for various reasons, operations for tonsillotomy were not desirable.

Dr. PEGLER said the operation was not very uncommon ten or twelve years ago, and he believed that the reason it was given up was because of the pain it occasioned. He asked whether this patient complained much from that cause. It would be interesting to see whether, after this, reduction by the galvano-cautery became the rage like enucleation as a routine treatment.

Dr. DUNDAS GRANT said the matter was a most interesting one, and it would be instructive to learn what was the exact appearance of the tonsil—for instance, the relation of the hypertrophied portion to the lacunæ; also, whether it looked fibrous, or soft, and whether there was any other treatment. He presumed the cautery was pushed deeply into the tonsil, away from the mouths of the lacunæ, because one objection to the cautery here was its tendency to seal up the mouths of these tubes. Years ago he had been deterred from using the cautery because neurasthenic people who had been submitted to cauterization of the tonsils at other hands had afterwards neuralgic pain at the site, and this persisted for a considerable time.

Sir FELIX SEMON said he was listening to the debate with some amusement, because in their speciality many things seemed to occur in cycles. Formerly it was a sort of universally accepted, if unwritten, rule, that in cases in which the tonsillotome was not well applicable, as in cases of adults, or when considerable hæmorrhage might be expected, the galvano-caustic method was the one to be selected. After it had been used—and he was afraid he must say, much abused—in many cases, as for some time it was in the nose, it all of a sudden fell into entire desuetude. Now the President had revived it. If he were still in practice, he would still use the galvano-cautery for suitable cases of enlarged tonsils, particularly in adults with hard tonsils, which it was necessary to reduce, and in whom the tonsillotome was not to be recommended. The pain of the operation itself was minimal, after previous cocainization, and if afterwards orthoform or anæsthesin was insufflated, the after-pain was much reduced, even in neurasthenic patients.

Dr. IRWIN MOORE said that formerly he had often used the method of galvano-puncture, and was satisfied with the result. He did not think he had had one case of pain or inflammatory reaction. The patient could be cocainized in the consulting room, and come once a week for five or six weeks. He had used it for children from 8 years of age upwards, and it was quite satisfactory if their confidence was gained by the operator and they would sit quiet.

Dr. DAN MCKENZIE said that notwithstanding the furore raging around the tonsillotome, no one had been heard to recommend it in such a case as this, showing that there was a class of case in which the galvano-cautery was the proper treatment for the reduction of tonsils.

The PRESIDENT, in reply, said, that the galvano-puncture caused practically no pain, and the patient seemed willing for him to make as many punctures as he wished, but on no occasion did he make more than three. The tissue was glandular, soft, and not inflamed. He would not have used the cautery if the tonsil had not been fibrous, because it might have caused the locking up of septic accumulations, which would have produced localized areas of inflammation. No iodides or arsenic were given, but after the third sitting—i.e., after great diminution had already taken place—he gave the patient some arsenic and nux vomica. The tonsils were first painted with 15 per cent. cocaine, and he then used a fine long cautery point and passed it deeply into the middle of the most prominent portions of the tonsil. Presumably the cauterized regions were not very absorptive, and he supposed the cautery set up acute defensive inflammation, with such leucocytic exudation around the cautery track that micro-organisms found a difficulty in entering.

Ulcerating Growth of Left Vocal Cord, probably Epithelioma.

By HERBERT TILLEY, F.R.C.S.

PATIENT, male, aged 42, applied to hospital for hoarseness of twelve months' duration. He has always been healthy and there is no history of any constitutional disease. The left ventricular band and cord are replaced by an uneven, granular swelling. There is some movement of the cord and the arytænoid moves freely. Wassermann test negative. No physical signs of tubercle in the lungs.[1]

Extensive Syphilitic Necrosis of Bones in Relation to the Nasal Cavities.

By C. W. M. HOPE, F.R.C.S.

M. C., FEMALE, aged 47, attended King's College Hospital for the first time in September, 1911, complaining of nasal discharge and slight ozæna.

Past history: Injury to nose twenty years ago. Had seven children; four alive and healthy at present time; three died at ages of 3, 5, and 9 years, of scarlet fever, measles, and rheumatic fever.

Diagnosis of gummatous rhinitis made, and patient put on a mixture of potassium iodide 5 gr. (increasing to 15 gr.) and inunctions of ung. hydrarg.; coll. alk. sacch. used as a nasal lotion.

By November 7, 1911, septum had necrosed away. Patient continued treatment regularly until December, 1911.

June 14, 1912: Six months later returned with shocking ozæna, very marked nasal depression, and nose filled with pus, crusts, and sequestra. Several sequestra were removed by means of Luc's forceps and a Sanitas nasal lotion ordered.

June 21: More sequestra removed. Wassermann reaction found strongly positive; nose still very foul smelling. On cleaning out nose, both nasal bones were found absent, both maxillary antra almost completely laid open into the nose, and a tooth found protruding into the floor and removed by the nasal route (right lateral incisor).

---

[1] January 9, 1913: This patient has been operated upon; the growth was a squamous-celled epithelioma.—H. T.

On July 6, 1912, 0·55 grm. of salvarsan was given intravenously, and again on July 12, 1912, by Dr. Emery. The nose at once began to clean up, ozæna rapidly disappeared, and the nose now is clean and sweet, and patient has put on weight and lost the marked anæmia present on June 14, 1912. The sequestra proved to be the two nasal bones, nasal processes of superior maxillæ, and anterior halves of palatal processes of same bones. There is no perforation of the hard palate in front.

DISCUSSION.

Dr. DUNDAS GRANT said he brought before the Laryngological Society a similar case in which no improvement took place until injections of calomel were given into the muscle, the patient being at the same time highly fed with cream and stout. She went on very well, but a year later she died of nephritis. If he were to have a similar case now, he would use salvarsan, but would afterwards use mercury, as seemed to be thought necessary by authorities.

Mr. PARKER said he had a man under treatment for tertiary syphilis, whose nose at first was packed with offensive crusts. After the first injection of salvarsan these crusts had disappeared, and there had been no recurrence of either crusts or stench, in spite of the Wassermann test remaining markedly positive after four injections.

Mr. WESTMACOTT spoke of a case in which the crusts and sequestra were removed on successive visits, but after the patient had been on 20 gr. of potassium iodide three times a day, they cleared up in a remarkable way. No mercury or other form of treatment was given. He recently had a case in which necrosis of the ethmoid region had broken through the wall into the orbit, and produced some proptosis. The Wassermann test was positive. Here again, he had removed two or three large sequestra, and 20 gr. of potassium iodide had given great benefit. As regards the eye, the proptosis had disappeared. He regarded it as essential to give at least 20 to 30 gr. thrice daily—smaller doses did not seem to give any relief.

Dr. PEGLER noted that the report stated the nose to be sweet and clean, but he found that purulent material was pouring out of the right antrum, and the left one was far from clean; unless these cavities were carefully washed out, the nose would be liable to reinfection.

Mr. HOPE, in reply, said that Wassermann's test had not been done a second time. He admitted there were now some granulations present, but they were not there when he wrote the notes. The patient had used gauze packing a few times, but she had given it up.

A Case of Branchial Fistula.

By G. H. L. Whale, F.R.C.S.

J. D., male, aged 29. There is a small sinus over the right ala of the thyroid cartilage. A small probe passes upwards ½ in. only. The sinus weeps during and after meals. But the collected discharge is much too viscid for saliva; moreover, it retains its alkalinity indefinitely, and does not convert starch into sugar. This is therefore presumably a blind external branchial fistula, although the opening is not quite in the usual place.

Indication for treatment: The discharge soils his collars and the sinus-mouth occasionally suppurates.

DISCUSSION.

Dr. Dundas Grant regarded it as an aberrant thyro-lingual duct, although the opening was at some distance from the normal position; with the fingers he could trace it to the hyoid bone. A careful operation might get it well. A fine probe must be passed up until it got to the hyoid bone, and it should be uncovered as far as possible by dissection, and through the tube a fine electric needle (electrolytic or galvano-caustic) could be passed. In two cases in which he did this there was no recurrence.

Dr. FitzGerald Powell was of opinion that this was a sinus remaining from a cyst in connexion with a branchial cleft which had been opened in early youth. At the bottom of the sinus would be found a distended portion, from which secretion arose. He had dissected these out, and found no great difficulty in doing so. He could not agree that it was a sinus in connexion with the thyro-lingual duct; it was well away from the middle line.

Mr. Wilkinson did not see why it should not be a branchial fistula derived from the fourth branchial cleft. The inner opening of such a cleft would be situated in the pyriform fossa. An operation for dissecting it out might prove a serious undertaking, owing to the close relations of the sinus with the sheath of the carotid and other important structures in the neck.

The President considered it to be a branchial cleft. In a family of eight whom he knew, four had these branchial clefts and one had auricular appendages. They were mentioned in a paper on the subject which Mr. Howell Evans had published.[1] The chief inconvenience was the soiling of the collar which occurred. An extensive dissection was often necessary for the cure of these clefts, for sometimes they went deeply towards the side of the pharynx and the base of the tongue.

---

[1] *Proceedings*, 1909, ii (Discussion on Heredity and Disease), pp. 98-105.

Aberrant Thyroid Tumour from the Base of the Tongue.

By W. G. Howarth, F.R.C.S.

The patient complained of great difficulty in swallowing with occasional attacks of dyspnœa. The tumour involved the base of the tongue in the middle line, and was pressing against the lingual surface of the epiglottis. There had never been any symptoms of thyroid insufficiency. The thyroid in the neck was scarcely palpable, but at the time of operation, when a preliminary laryngotomy was performed, both lateral lobes were found to be present, though no trace of the isthmus could be detected. The section shows a fibrous capsule outside a layer of thyroid glandular tissue; the centre of the tumour is made up of blood-clot.

Fibroma from the Soft Palate.

By W. G. Howarth, F.R.C.S.

This occurred in a patient who had a papilloma of the uvula removed six months ago. The section shows fibrous tissue in every stage of development.

DISCUSSION.

Mr. Howarth said that six months ago he had removed a papilloma from the uvula and put in a catgut stitch. It had been suggested to him that the present tumour had been caused by the irritation of the stitch, and he would be glad to hear the experience of others.

The President remarked that at one of the meetings of the old Laryngological Society a member remarked that tumours of the soft palate were very rare; but during succeeding meetings of the Society several cases were shown. Mr. Stephen Paget showed a case of fibroma of the soft palate, and other members also exhibited cases of non-malignant tumours of the soft palate.

Healed Lupus of the Pharynx and Larynx.

By W. G. HOWARTH, F.R.C.S.

THIS case was shown in March, 1912.[1] The condition was then extremely active, the pharynx and larynx being ulcerated and swollen.

DISCUSSION.

Mr. HOWARTH said, in regard to this case, that nothing in the way of local treatment had been used. It was well known that such cases had a tendency to heal spontaneously. He had taken care that the patient was in the best hygienic conditions, and he gave her cod-liver oil and milk, but no local treatment and no drug.

Dr. FITZGERALD POWELL asked if arsenic had been given. He had had under care a girl whose larynx, pharynx and nose were in a similar condition, and had cleared up completely under arsenic. He would like to know if the members had found benefit from arsenic in similar cases—or was the cure due to cleanliness and improved hygenic conditions?

Mr. LOGAN TURNER asked if members had had experience in connexion with the treatment of lupus by Pfannenstill's method—namely, using nascent iodine and ozone or hydrogen peroxide. He had treated several cases in that way, and was so far pleased with the results. The patient was put upon sodium iodide, and pledgets of sterilized gauze soaked in hydrogen peroxide were placed in the nasal cavities. Cases which had been treated by curetting and scraping without success responded very well to this method. He was applying it in a case very much like the one shown, with pharyngeal and laryngeal lupus.

Mr. HUNTER TOD said that with regard to the treatment of lupus of the nose, the method of plugging the nose with hydrogen peroxide solution, together with internal administration of iodides, as described by Mr. Turner, had been used in the London Hospital for some time, but the results had not been very successful. No doubt it had been beneficial in some of the mild cases, but the chief difficulty was to make the patients continue with the treatment as it was so disagreeable. With regard to curetting the nose, whatever might be the opinion of others, he himself was certain that it was by far the best treatment. At the London Hospital, owing to there being a Lupus Department, he had the opportunity of seeing and treating a very large number of cases. It was interesting to note that those in charge of the Lupus Department refused to treat cases of lupus of the face unless the nose had been examined, because it was found that, although there might be no external signs pointing to lupus within the nose, it frequently existed, and that until the lupus within the nose had been removed by curetting, and although a temporary cure might be obtained of lupus of the face by the Finsen light treatment, a recurrence usually took place. On the other hand, if the nose was thoroughly curetted, not only was a more rapid and better result obtained by the light treatment, but it was usually permanent. Mr. Tod's method of curetting the nose was by means of the ring knife. He did not claim immediate cure, but if recurrence took place, the part could again be curetted under the local anæsthetic of cocaine. The very emphatic opinion of those in charge of the Lupus Department at the London Hospital was that, although arsenic might be beneficial, and might improve the condition of health, its use, or applications of lactic acid, carbolic acid, the cautery, and other out-of-date methods of treatment were of no value. They pinned their faith absolutely to free curetting, and this had been definitely proved by the results.

---

[1] *Proceedings*, 1912, v, p. 118.

Sir STCLAIR THOMSON thought sufficient stress had not been laid on the fact that this particular case had got quite well without any local or general treatment. He had emphasized this point at more than one of the meetings. A drawing of one such case was given in his book—a very extensive case of lupus in the larynx in a girl who had nothing done to the larynx, and whose lesion had remained cicatrized for eight years. This case might be compared with the case shown by Mr. Hastings (*see* p. 54), but the latter was a typical tuberculous ulceration. Though both had the bacillus of Koch as a basis, the lesions were very different. In view of what he had said, one should be very modest in ascribing successes with lupus to any particular treatment, and under those treatments he included arsenic; he had made a careful trial of arsenic, but it had proved a failure, though a few cases improved under it. Many cases of lupus which got well broke down again.

Dr. D. R. PATERSON said that in two cases he tried the method mentioned by Mr. Logan Turner, and had good results. The patients had had various kinds of treatment before, including repeated scrapings and the administration of arsenic, cod-liver oil and iodopin. He took the patients into hospital as it was difficult to get constant supervision at home. He kept the gauze constantly soaked with the peroxide of hydrogen, and gave sodium iodide internally. He treated one of the cases months ago, and six months later there was no recurrence.

Dr. DAN MCKENZIE said his experience had not been so favourable as that of Dr. Paterson. The process was very tedious and difficult to apply, it made the patient uncomfortable, and it was necessary for the application of the peroxide to be constant, so as to get the full effect of the nascent iodine. In the cases in which he had applied it, the patients had been very persistent and conscientious, yet the results after the first few weeks were not good, the condition seemed to slip back, so that the net result of the treatment was practically *nil*.

Dr. H. J. DAVIS said he had had an unfortunate experience with hydrogen peroxide. Two years ago a colleague sent him a patient, with the request to curette the palate, where she had undoubted lupus as well as in the nose. He told her to do nothing for a fortnight, and see him again at the end of that time. It had improved very much. He then ordered her applications of peroxide of hydrogen. The result was unfortunate, for the palate gave way and caused her considerable suffering. He left it alone for a time, and the palate healed. Later she used it again with the same result—the strength of the peroxide was 10 vols. The palate healed perfectly with lactic acid and orthoform applications, and he believed the patient had remained well ever since. The palate was not curetted.

Mr. HOWARTH, in reply, said that he did not give the patient any arsenic. He had not had any experience with Pfannenstill's method.

Kuhn's Per-oral Intubation Apparatus.

By W. G. HOWARTH, F.R.C.S.

THIS apparatus is very useful for operations at the back of the throat or nose where bleeding is very severe, as by its use the necessity for a preliminary laryngotomy is obviated.

DISCUSSION.

Mr. HOWARTH said he had used the instrument for eighteen months with considerable satisfaction. In many cases he did not now do preliminary laryngotomy, but used these tubes. He did so in the palate case he showed that day, and in such cases as sarcomata of the tonsil and post-nasal space. He was surprised that the apparatus was not better known in England, as it had been used very largely on the Continent for several years.

The PRESIDENT asked if Mr. Howarth did not find that blood sometimes passed beyond the vocal cords into the trachea, for he had heard it stated that the instrument did not completely occlude the glottis.

Sir FELIX SEMON said he had seen the tubes repeatedly used in Professor Killian's clinic in cases of operations on the upper air passages, and there had been no escape of blood into the lower air passages, even when there was much bleeding at the time of the operation. The method seemed an excellent one.

A Small Swelling in the Post-nasal Space.

By G. W. BADGEROW, F.R.C.S.Ed.

THE patient, a male, aged 25, came to the Throat Hospital, Golden Square, complaining of deafness, duration six years. He is unable to hear the watch on contact to the left ear. On examination of the post-nasal space, a small rounded swelling is noticed ; it is soft and fluctuating to the feel. The patient has no difficulty in breathing, nor is the voice altered. On raising the palate the swelling is made to protrude. The patient has not had an operation for removal of adenoids.[1]

DISCUSSION.

Mr. BADGEROW added that he had not seen a similar case. It might be a mucous cyst or a retention cyst of the adenoids.

Dr. BROWN KELLY said he considered that the condition was due to a cyst. The references in text-books to this affection were very meagre, but a good description of it might be found in Tornwaldt's "Bursa Pharyngea."

Meningocele in the Nasopharynx.

By H. A. KISCH, F.R.C.S.

THE infant, 6 months old, was brought to the hospital on account of difficulty in breathing through the nose. There is a cystic tumour in the nasopharynx, pushing forward the soft palate. The tumour is situated in the mid-line, and becomes tense when the child cries. It is apparently attached to the anterior surface of the spine. There is no evidence of nerve involvement, or other abnormality. An X-ray photograph has been taken.

---

[1] I have since operated on the above case and found the swelling to be a cold abscess in connexion with the vertebræ, with erosion of the bone.—G. W. B.

The Fin of a Haddock extracted from the Œsophagus.

By C. W. M. Hope, F.R.C.S.

(Shown by Dr. H. J. Davis.)

The fin of the haddock was removed from the patient by the direct method. Ten days after its lodgment the position occupied by it was 4 in. below the cricoid. It had given no inconvenience beyond slight difficulty in swallowing solids.

A Chicken Bone 1¼ in. long removed from the Upper Part of the Œsophagus.

By D. R. Paterson, M.D.

This was taken from a young Chinaman, who presented himself at the hospital with almost complete œsophageal obstruction and pains in the upper part of the gullet of forty-eight hours' duration, which had come on after eating some chicken. A medical man had cautiously passed a bougie, and having ascertained the presence of an obstruction, had wisely refrained from any further attempt. With the œsophageal tube the upper end of the bone was exposed just below the cricoid orifice. Grasping it with the forceps, its lower end appeared to be fixed in the œsophageal wall. It was easily removed. Both its ends are sharp. The specimen is shown to illustrate (1) the danger of attempting to push down such a body with a bougie; (2) the advantage of using a straight-ended tube for work in the upper section of the gullet.

DISCUSSION.

Dr. Brown Kelly said that for removal of sharp foreign bodies impacted in the upper part of the œsophagus he recommended Killian's or Hill's dilatation speculum, preferably the latter. One branch could be placed in front and the other behind the foreign body, which usually lay with its long diameter transversely.

The President referred to a case which had come under his care about three weeks previously in which a halfpenny had been lodged just below the cricoid region of the gullet for five days. On direct examination the coin was seen lying in an ulcerated area and surrounded by œdematous granulations. It was removed with little difficulty, but the child died the same night from collapse. At the post-mortem examination the œsophagus was found to be ulcerated right through into the trachea and that had occurred in five days. Possibly the coin was septic before it entered the throat.

Dr. DAN MCKENZIE said it was nowadays fairly common to hear of foreign bodies removed from the air passages, and one wondered what happened to those cases before the introduction of long tubes. Did the patients invariably die or become the victims of serious disease? There must be some foreign bodies which caused but a trivial disturbance, otherwise more fatal cases would have been heard of.

The PRESIDENT remarked that possibly many of the unsuspected cases of foreign bodies had suffered from bronchiectasis and were regarded as such. In one case of bronchiectasis which had been referred to him, the foreign body had been retained for three and a half years. Possibly some hitherto obscure cases of septic pneumonia were due to impacted foreign bodies.

Dr. PATERSON, in reply, remarked on the ease with which the laryngeal region could be examined in Chinamen, who required but little cocaine. In this case the Chinaman stood examination well, and the removal was extremely easy to carry out.

Telescopic Œsophageal Tube with the Outer Tube Straight-ended and the Inner Tube Beaked.

By D. R. PATERSON, M.D.

THE exhibitor has constantly used this tube for the last three years. A disadvantage of the ordinary bevel-ended outer tube is that when working in the upper part of the œsophagus its point travels in front of the line of vision and, further, exposes only one side of the canal to view. On the other hand, a straight-ended tube, as it passes down, opens out the whole circumference of the œsophageal wall simultaneously. The instrument shown has a bevel-ended inner tube which, acting as a pilot, is easy of introduction. Once past the cricoid opening it is withdrawn, leaving the straight-ended outer tube to continue the examination. The latter, being wider, gives, moreover, greater room for manipulative measures.

Dr. DUNDAS GRANT said the tube was an obvious improvement. It acted like a mandrin, but permitted of inspection during its progress. The wonder was that it had not been thought of before. Those who had had difficulty in passing a straight-ended tube past the cricoid cartilage must have wished for some such instrument.

A Case of Hyperostosis Cranii.

By EDWARD D. DAVIS, F.R.C.S.

THE patient complained of deafness of gradual onset. The swelling of the right cheek was noticed about twenty years ago, and eighteen years ago (1894) Sir Watson Cheyne removed an osteoma from the infra-orbital margin and the facial wall of the antrum. The denture now worn was made eleven years ago, and the fact that the plate is ¼ in. from the teeth gives a rough estimate of the rate of growth of the palatal swelling. No family history.

Present condition: A woman, aged 43, with an osseous and uniform swelling of the palatal process and facial surface of the right maxilla or the mastoid process. The nose is normal. Both antra are opaque to transillumination. The right external auditory meatus shows exostoses. The Eustachian tubes are obstructed. Skiagrams are shown with the case. No other exostoses can be found. Wassermann reaction negative.

DISCUSSION.

Mr. WILKINSON said there was a form of very slow growing osteo-sarcoma of the antrum. The antrum became filled with porous bone, in which the cell elements were scanty. Some cases of the kind had been reported in America. He had had one such tumour in a young female child, in which he removed the upper jaw. There had been no recurrence, but he had rather regretted having done so extensive an operation, attended as it was by serious deformity, where a less radical procedure might have sufficed.

Dr. PEGLER remarked that this case had not received the more familiar title of leontiasis ossium. He hoped to show the Section the skiagrams (if not the case itself) of an example limited to the parietal and upper mastoid region in an elderly lady, one side being chiefly affected, and deafness being associated with that side. It was a true hyperostosis cranii, and such a term as leontiasis was scarcely applicable to it.

Bullet Injury to the Larynx.

By H. J. DAVIS, M.B.

THE patient, a man, aged 22, was shot through the larynx. The bullet, a Mauser, passed out on the left side of the neck. There is now a swelling of the thyroid gland and the patient has palpitation. The view of the interior of the larynx is interesting. The vocal cords were evidently shot away, for on taking a deep inspiration the aperture of the glottis is circular, the apex of the anterior attachment of the true cords being replaced by a band of fibrous tissue which stretches on deep respiration like a piece of elastic.

DISCUSSION.

The PRESIDENT remarked that it was an excellent illustration of the extensive traumatism which many of our soldiers suffered from in the South African War, and had yet come through without permanent and total disablement.

Dr. DAVIS, in reply, said he wondered what was the cause of the induration of the thyroid gland. X-rays revealed nothing. The patient was originally admitted under Dr. Saunders on account of palpitation, and was referred to him (Dr. Davis) to ascertain whether he had paralysis of the left vocal cord. There was no cord paralysis, as there were no cords. The patient phonated with the ventricular bands.

Paresis of the Left Recurrent Laryngeal Nerve in a Woman, aged 35.

By H. J. DAVIS, M.B.

THE patient, a Russian, has an enlarged thyroid gland of which she complains. The voice is unaffected, although the left recurrent laryngeal is partially paralysed. Left abductor paresis.

Mr. NORMAN PATTERSON said he saw the case some time ago at Golden Square Hospital, but did not notice any paresis of the left cord. Now there might be slight abductor paresis of both cords, not specially associated with the left.

Papilloma of the Nose in a Man, aged 40.

By H. J. DAVIS, M.B.

THE entire left nasal cavity was occluded by a papillomatous growth; it was sprouting from septum, vestibule, and inferior meatus. The exhibitor assumed it was malignant, owing, among other things, to its vascularity—but this is not so. Several sections are reported to be "non-malignant papilloma" (by Dr. Elworthy). The growth was curetted—it has not recurred, but, as can be seen, is not completely removed; on the left side of the cavity a few elevations still remain in situ.

Microscopical section of growth also exhibited.

A Spicule of Rabbit Bone, $\frac{3}{4}$ in. in Length, removed by Upper Bronchoscopy from the Trachea of a Boy, aged 5.

By H. J. Davis, M.B.

The child, while eating boiled rabbit, had a choking fit lasting a quarter of an hour; it then stopped. The mother, who had pushed her finger down the boy's throat, thought that he had swallowed the obstructing body, but "as he had been unable to swallow anything since"—i.e., for twenty-four hours—she brought him to the hospital to see whether she was right in her surmise or not.

The child, I noticed, kept his head bent to the left with the chin flexed on the chest. This was put down "to shyness," but I put it down to the foreign body. An X-ray plate was taken with negative results. Nevertheless the bone was there all the same, and was easily seen with the bronchoscope owing to its ivory colour; it was fixed obliquely in the trachea about 2 in. below the cords, and was removed with the extractor under anæsthesia.

This case was anæsthetized by Dr. Phillips by injecting a syringeful of ether into the buttock, the child being primarily rendered unconscious by ethyl chloride. This method is a great convenience, for it disposes of the wafts of chloroform which the operator periodically receives in his face when inspecting through the tube. Anæsthesia was complete, and I can recommend the method to others.

The case is also of interest as it exemplifies the fact that absence of cough and other respiratory distress by no means excludes, as one would expect it should, the presence of a foreign body in the air passages. The symptoms in such cases are very severe at first, and then quickly disappear, as in this instance, and nothing may attract attention for some days until perhaps a unilateral bronchitis develops—whereas, when foreign bodies lodge and are retained in the œsophagus, patients are in trouble all the time.

The foreign body is $\frac{3}{4}$ in. in length, very sharp at both ends, hence its impaction.

DISCUSSION.

The PRESIDENT said the negative result of the X-ray examination was very interesting. Sometimes one could detect the foreign body by instantaneous X-ray photography which would not have been shown by the ordinary method. He remembered a case in which a foreign body was thus overlooked (a very hard and thick chicken bone), but it was at once detected by the instantaneous method.

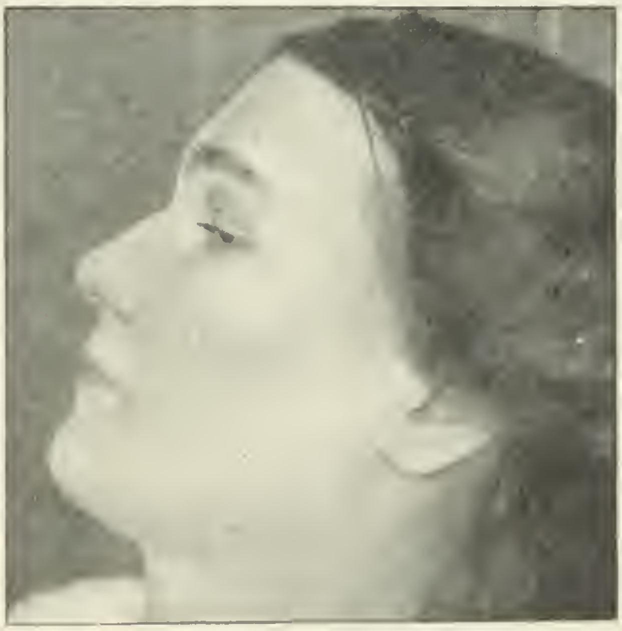
Dr. FINZI asked if a lateral view was taken in the case. Both lateral and anterior views should be taken. The instantaneous method should always be carried out in the case of children, otherwise there could not be a cessation of both breathing and swallowing during the exposure.

Dr. DAVIS, in reply, said that a lateral view was also taken. The child was quickly anæsthetized by ethyl chloride, and the injection was made not under the skin, but into the muscle of the buttock, which prevented sloughing of the skin. The liquid boiled at 90° F. The child was heavily asleep three-quarters of an hour after the operation. It was well known that injections direct into the muscle were not nearly so painful as those under the skin.

Photographs, untouched Prints, of a Young Woman after the Exhibitor's Double Radical Frontal Sinus Operation.

By P. WATSON-WILLIAMS, M.D.

THE patient had suffered for a long period from very severe supra-orbital headaches and pain at the back of the eyes, which prevented her following her occupation. She had double frontal sinus and double antral suppuration, and an operation on the antra and intranasal removal of suppurative ethmoidal cells failed to effect relief. The exhibitor's osteoplastic operation was performed a little more than a



Reproduced from untouched photograph of patient after Dr. Watson-Williams's double radical frontal sinus operation.

year ago. The frontal sinuses were very large and deep for a female, and though completely cured of all headaches, there was a slight central depression in the forehead. She did not complain of the cosmetic defect, but as the left antrum required further attention, the depression was removed by paraffin injection. She is now not only completely cured, but there is practically no trace of the operation, which has left no cosmetic alteration, and certainly no defect.

Case of Sarcoma of the Upper Jaw—Resection of the Left Superior Maxilla and Treatment of Recurrent Growth by Radium.

By P. Watson-Williams, M.D., and N. S. Finzi, M.B.

The patient, aged 69, had a swelling on the left side of the hard palate which his dentist had noticed seven years previously. The left nasal passage had become somewhat obstructed, and slight fullness noticed externally over left cheek when first seen by exhibitor in December, 1911.

On January 23, 1912, a growth was removed from the antrum, the anterior, inner, and outer walls being removed, but not the roof. The growth had invaded the floor, and was there stripped off the soft tissues of the palate. The growth was reported by Professor Walker Hall to be a round-celled sarcoma of slow growth. The long history of the palatal swelling seemed to justify the hope that it was of relatively slight malignancy.

The patient recovered, and it was thought the growth might not recur. But when seen in September the palate showed an elevated ulcerating growth resembling epithelioma. Histological examination showed the same structure as the original neoplasm.

On September 22 the superior maxilla was removed, but the growth had extended into the pterygo-maxillary fossa. It was removed as far as possible, but obviously without success, as it recurred in several places, and marked enlargement of the deep glands of the left side of the neck developed. The patient's urine was loaded with sugar, the glycosuria having arisen during the past few months.

Dr. N. S. Finzi has been treating the patient with radium with some amelioration, but his condition was considered hopeless before he was asked to see him.

Dr. WATSON-WILLIAMS said the case was shown not as an instance of the efficacy of radium in sarcoma, for the patient's general condition, and the very extensive and deep-seated growth, convinced him that the case was hopeless. Nevertheless, the improvement following his radium application was very decided, but the patient was not by any means free of the growth.

Small Round-celled Sarcoma; Partial Removal and subsequent Treatment by Radium.

By P. WATSON-WILLIAMS, M.D., and N. S. FINZI, M.B.

E. C., AGED 40. Enlarged gland noticed below angle of right lower jaw in February, 1912. It was diagnosed as probably tuberculous and was treated with tuberculin, but as it gradually increased and the right tonsil was somewhat enlarged the gland and the tonsil were removed. The macroscopic appearance of the gland suggested sarcoma, and the the histological examination by Professor Walker Hall confirmed this suspicion.

Patient was averse to any extensive operation, therefore it was decided to treat her with radium. Application of 200 mg. radium bromide have been made by Dr. Finzi for thirteen hours in three days (October 19 to 21); exposures of right tonsil region inside and to the thickened matted tissues behind and below the angle of the jaw. There is now no evidence of the former growth.

Sarcoma of the Right Superior Maxilla; Removal of Jaw and subsequent Applications of Radium for Recurrence.

By P. WATSON-WILLIAMS, M.D., and N. S. FINZI, M.B.

E. M., FEMALE, aged 30. First seen July 9, 1912, complaining of dull aching in right cheek for a few months. There was an obvious smooth, rounded fullness over the right maxillary antrum (first noticed by a dentist in October, 1911), a smooth swelling of the hard palate on the corresponding side, and the right inferior and middle turbinals were pushed in, partially occluding the right nasal passage. The exhibitor's antral exploring syringe was used, the needle passed through the middle meatus, and a small portion of the growth sucked into the needle enabled Professor Walker Hall to report that the antral growth was a large round-celled sarcoma.

Operation, July 10: Removal of right upper jaw, the antrum being found filled with growth which had involved the roof, outer wall and floor and extended backwards to the pterygo-maxillary fissure. She recovered without any noteworthy feature. By carrying the infra-orbital incision higher up towards the inner canthus than usual, one gets little external deformity as the zygomaticus major is divided near its upper insertion. Professor Walker Hall reported that sections showed the growth was a large round-celled sarcoma (osteoid sarcoma).

July 25: Portions of recurred growth reported to be osteoid sarcoma removed from floor of orbit and from alveolar margin.

July 31: These areas were operated on afresh, but similar recurrences developed in the orbital floor far back and in the pterygo-maxillary fissure.

She has since then been treated by Dr. N. S. Finzi at the Metropolitan Hospital and appears to have remained free from any evidence of recurrence.

Radium bromide 200 mg. used for exposures, with ½ in. platinum filter: (*a*) August 22 to 28, four exposures; (*b*) October 14 and 15, exposures lasting twenty-four hours altogether.

DISCUSSION.

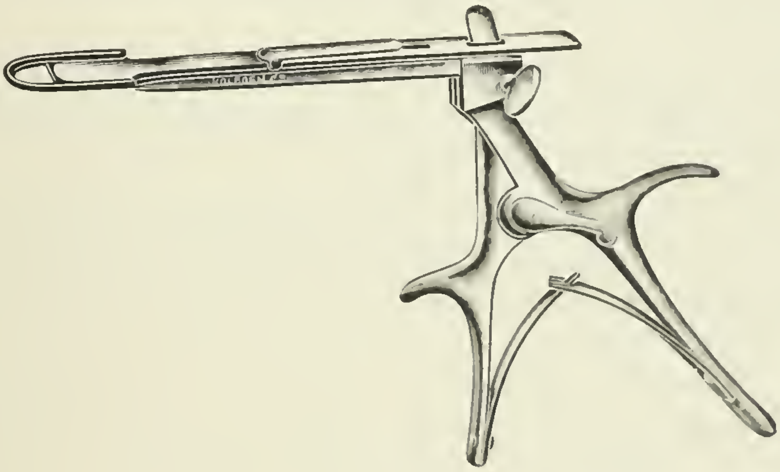
Dr. **Finzi** said that in the last case the radium was applied continuously for ninety-six hours, starting August 23, 1912, forty-eight hours packed in the cavity and the rest of the time on lint externally; the radium employed was 200 mg., and the metallic filtration of the rays used was 2 mm. thickness of platinum. She had a second exposure on October 14, lasting altogether twenty-four hours. The first case, that of the old man, had the same quantity of radium and the same filtration; he had it packed inside the nose for forty hours, outside, over the glands on both sides of the neck: the application lasted altogether two days. A second similar application had just been completed. It must be remembered that this case was one which was absolutely hopeless, and the radium was applied solely with the idea of affording relief, and it had certainly done so. The second case was one of sarcoma of tonsil which had been removed, but in which there was a swelling in the neck. She had an exposure with radium against the tonsil, with the same filtration and the same amount of radium, for four and a half hours, then she had fourteen and a half hours with the radium outside, on lint under the jaw, and another fourteen and a half hours just behind the jaw. There was a severe reaction afterwards, but the tumour had disappeared. With regard to the class of case in which radium was useful—where the growth was in the upper jaw, the round-celled sarcomata were almost invariably benefited by radium. Some of his best cases were of that class of growth. The extremely rapidly growing epitheliomata which had started in the antrum and recurred rapidly when it was removed surgically also did very well with radium. Some epitheliomata were very refractory; the squamous-celled growth of the mucous membrane as a rule did badly, but he had occasionally had good results there also.

The PRESIDENT said the Section should be grateful for this indication of the kind of cases which radium might be hoped to relieve. Up to the present it seemed impossible to do anything curative with squamous-celled epitheliomata, especially of the buccal laryngeal or œsophageal mucous membranes; at least this was the experience at the Radium Institute where there was no difficulty in obtaining requisite quantities of radium.

The Tonsillectome—a New Type of Guillotine or Tonsillotome specially designed for the Enucleation of Tonsils.

By J. F. O'MALLEY, F.R.C.S.

THIS instrument is intended for enucleation only, hence my reason for calling it a *tonsillectome*. The original pattern was designed by Ballenger, of Chicago, for Sluder's method. This instrument differs in many details from Ballenger's, and has been gradually evolved to meet the difficulties of enucleation as they arose in the method which I use. I have used this type of instrument for over a year in close on 1,000 cases, with very satisfactory results. With the two sizes, 100 per cent. of tonsils can be removed as completely as it is possible by any other method of enucleation, each tonsil taking four to five seconds. The hæmorrhage is exceptionally slight, being only an average of 3 dr. for both tonsils in a large series of cases. The smaller size is ample for over 90 per cent. of the tonsils found in children up to 12 years of age. The larger size is needed for the remainder of nearly 10 per cent. and



The tonsillectome.

for the cases of large, adherent tonsils of young adults. The essential features are:—

(1) The ring is solid, having no slot.

(2) It is thin, being only $\frac{1}{16}$ in. on cross-section.

(3) The upper and lower rims which form the ring are brazed together, leaving on the inner or concave aspect a small recess. This is filled with lead, on to which the blade is driven.

(4) The shaft and blades are $6\frac{1}{2}$ in. long. The shaft is stout and strong, and the blade is blunt.

(5) The opening of the smaller size gives the following measurements: (*a*) transverse diameter $\frac{11}{16}$ in.; (*b*) antero-posterior diameter $\frac{10}{16}$ in. The larger size is $\frac{13}{16}$ in. each way.

(6) The posterior end of the opening is square (not round or oval).

(7) The margin of the upper rim around the opening is square (not bevelled, as in the usual type of tonsillotome).

(8) A lever in the handle drives the blade home.

It was made for me by the Holborn Surgical Company.

The advantages claimed for the special features of this instrument are the following:—

(1) The ring, being solid, is strong without being bulky, and is consequently more easily slipped under the deep aspect of the tonsil than the usual type of slotted ring.

(2) The absence of a slot, and the blunted blade, reduces the cutting power of the instrument to a minimum, and accordingly the risk of button-holing, and cutting through the anterior pillars, base of the tonsil, and edges of the capsule.

(3) The cutting is practically reduced to that of the mucous membrane surrounding the free aspect of the tonsil, as the blunted blade when properly inserted travels in the plane between the pharyngeal aponeurosis and the capsule, inverting the latter. When the dull blade is driven home against the leaded face, the blood-vessels entering the periphery of the tonsil are crushed, and when the instrument is turned on its own axis to remove the gland, the vessels are torn across and the bleeding is slight in consequence.

(4) The stout shaft provides for the strength necessary, to resist the pressure used in raising the tonsil forwards, and prevents the springiness which causes the blade to jump out of its socket.

(5) The smaller the opening in relation to the size of the tonsil—if the latter can be crowded comfortably through—the more readily will the capsule be completely inverted.

(6) The small opening and thin ring keeps the size of the instrument such that it can be introduced between the faucial pillars of patients of any age, from early childhood upwards, and is still large enough for nearly 90 per cent. of the cases one meets with.

(7) The square posterior end of the opening allows a little more room at the angles without increasing the size of the instrument; and the straight edge so formed is parallel to the anterior pillar when the tonsillectome is properly in position, and acts as a guide for the insertion of the blade.

(8) By having the upper margin around the opening square instead of bevelled, it is capable of raising a fold on a flat skin or mucous surface, and will therefore grip under the flat, friable tonsil whose lower pole is shelving.

(9) The lever in the handle enables one to apply more force in thrusting home the blunt blade than is possible by thumb pressure. The use of this lever will present a little difficulty in the beginning to those operators who have always been accustomed to thumb pressure.

DISCUSSION.

Dr. WATSON-WILLIAMS was sure the principle of the instrument shown was the right one; more than a year ago he had designed a similar instrument, and more recently Professor Ballenger had shown him his original tonsil forceps, which was very much like his own design. He did not think it necessary to have quite such a long blade.

Dr. IRWIN MOORE congratulated Mr. O'Malley on his improvement, but thought the Heath guillotine would be hard to beat. With the reinforced pattern of the latter the enucleation of the tonsils by means of the guillotine was perfectly simple.

Mr. O'MALLEY said he found his instrument very effective, and he was in the habit of operating on thirty cases in a morning, at his hospital, in two hours.

Tumour of the Right Superior Maxilla.

By J. F. O'MALLEY, F.R.C.S.

F. W., AGED 26, noticed swelling two months ago. Onset gradual; has steadily increased. No pain or tenderness at any time. No nasal discharge or obstruction.

Examination: Hard swelling on anterior aspect of right superior maxilla. It extends upwards to infra-orbital margin, inwards on nasal process and down to alveolus. It does not involve the orbital, palatal, or nasal aspect of the maxilla.

Transillumination: The left crescent is clear and distinct. The right is present, but not so clear as the left.

Lavage: The solution passed in and out freely, and unstained.

No X-ray examination was made, as the time did not allow.

There were two questions of interest in this case. The first was to determine whether the antrum was involved or not; and the second, if it was affected, what was the nature of the disease? The absence of pain or tenderness, no nasal discharge, no alteration in the orbital, palatal, or nasal walls of the antrum, no egg-shell crackling, and the results of transillumination and lavage practically exclude any affection of this cavity. The hardness of the swelling, the absence of pain or tenderness, and of infiltration of the superficial tissues, and no pulsation, point to a benign growth such as an osteoma. The history of two months' growth is, however, rather short for an osteoma of this size.

DISCUSSION.

Mr. WRIGHT said he thought the skin was adherent over it, and it felt very much like a periosteal sarcoma of the malar bone.

Mr. O'MALLEY replied that he examined the case carefully under cocaine and adrenalin. There was some inflammatory reaction to-day round the puncture of the trocar and cannula, and that was the cause of some oozing of a serous exudate which led one of the members, earlier in the evening, to think that the nose was being invaded by an antral growth. There was no trace of bulging on the previous day.

A Case of Tuberculous Ulceration of the Pharynx with Involvement of the Larynx.

By SOMERVILLE HASTINGS, M.S.

PATIENT is a young woman, aged 24. Two months ago she began to complain of aching pain in the throat, especially on the left side. A little later the voice became slightly hoarse and a cough developed. The pain in the throat is now more severe, and at times keeps her awake at night. There is some pain in swallowing, but this is not severe. The pharyngeal surface of the left tonsil is covered by a rough, nodular growth, ulcerated in places, which has spread to both pillars of the fauces and to the soft palate, and extends downwards as far as the epiglottis. The growth is firm to the touch, but there is no deep induration. The epiglottis is swollen and pale, and so are both arytænoids. The cords are normal. The uvula is red and œdematous, and a lymphatic gland about the size of a filbert-nut can be felt behind the angle of the jaw on the left-hand side.

Dr. R. A. Young reports prolonged expiration at both apices, and a slightly impaired note at the right apex behind, and thinks both lungs are affected by tuberculosis. Wassermann's reaction is negative, and a small portion of the growth removed for histological examination shows typical giant cell systems.

Tumour of Region of the Left Palate.

By Hunter F. Tod, F.R.C.S.

Male, aged 40, tumour first noticed two weeks ago; painless. Was twice incised by the doctor, who thought it was a quinsy. The post-nasal space is found to be partially blocked owing to the swelling of the soft palate posteriorly.

Swelling and Ulceration of Subglottic Region of the Left Side of the Larynx.

By Hunter F. Tod, F.R.C.S.

Female, aged 28. The patient had a large mass on the left side in the subglottic region, and fixation of that side of the larynx. She had been treated for tuberculous trouble of the left knee-joint for three years. Some hoarseness and cough for about one year. No tuberculous disease of lungs. Mr. Tod regarded the case as tuberculous, and invited suggestions as to treatment.

Sir Felix Semon said he would be afraid to do anything in this case on account of the complete fixation of the crico-arytænoid articulation. He did not see any immediate necessity to interfere.

Case of Post-nasal Tumour.

By Norman Patterson, F.R.C.S.

Patient, a woman, aged 48. Post-nasal growth removed ten years ago by Dr. Lambert Lack, to whom I am indebted for permission to show the case.

Recurrence: On November 11, 1912, in Dr. Lack's absence, I removed, by means of a snare, a tumour the size of a walnut, from the region of the left Eustachian tube. It was a firm fibrous mass and presented no ulceration.

Four years ago gathering in left ear. Watch now not heard on contact.

Growth appears clinically to be benign, but pathologists report on last specimen that it is a squamous and polygonal-celled carcinoma.

Patient now shows some fullness over the left Eustachian orifice, but there is no ulceration.

Opinions as to the nature of the tumour and the treatment to be adopted are invited.

DISCUSSION.

The PRESIDENT said he had seen seven cases of endothelioma of the lateral wall of the nasopharynx. The cases had all been fatal. They usually produced deafness, with serous effusion in the tympanum, anæsthesia of the third division of the fifth nerve, and mechanical fixation of the levator palati. At first he thought this case was endothelioma, but the history seemed too long for this view to be maintained. Each of his cases recurred in six or seven weeks to two months after operation.

Mr. PATTERSON replied that he had had an endothelioma in a patient, aged over 50. He removed it as far as he could through the soft palate, but it recurred in two or three weeks. There was great pain in the occipital region and a discharge from the ear.

Swelling of the Larynx.

By W. H. KELSON, M.D.

THE patient was a woman, aged 40, suffering from swelling of the left arytænoid, left ventricular band, and adjacent part of pharyngeal wall. She stated that discomfort had come on directly after a meal about a week previously. The left cord did not seem to be affected. No history or indication of tubercle or syphilis could be obtained. The affected parts looked very œdematous.

[Subsequent history: A week after the exhibition of the case a free discharge of pus took place and the whole swelling subsided.]

Mr. WRIGHT said the case looked to him like one of acute perichondritis with abscess, or possibly sub-perichondrial hemorrhage resulting from the strain of vomiting. The patient had a similar attack a year ago, and she had now got considerable swelling on the left side, apparently fluid, involving the arytænoid and the false cord region, practically blocking up the whole of that side of the larynx.

Laryngological Section.

January 10, 1913.

Mr. Herbert Tilley, President of the Section, in the Chair.

Temperature Chart from an Obscure Case of Streptococcal Infection of the Throat.

By Herbert Tilley, F.R.C.S.

On November 18, 1912, I saw, in consultation with his physician, a boy aged 10, who had been confined to bed for a fortnight because of an evening temperature which regularly reached about 100° F. Otherwise, his general health was good, he was well nourished, and his spirits were excellent. Tuberculous glands had been removed from his neck three years previously. At the commencement of his illness he had a slight sore throat, the small tonsils were a little red and swollen, especially on the right side, where the corresponding gland under the angle of the jaw was tender on pressure. These symptoms quickly disappeared, but the evening rise of temperature continued. Careful and repeated examination of the chest, abdomen, joints, excreta, &c., failed to give any clue as to the cause of pyrexia.

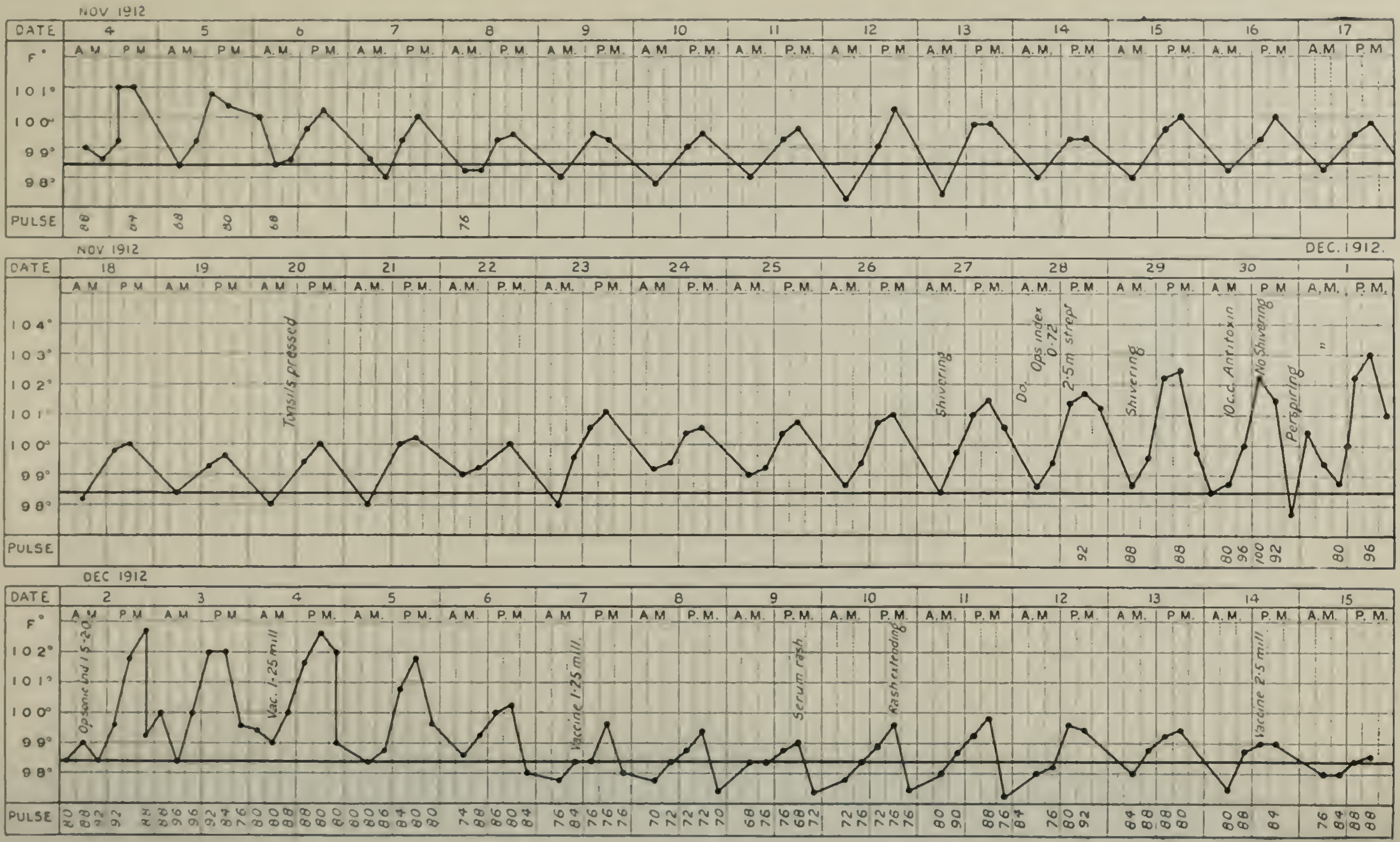
When I saw him on November 18, the soft palate and fauces were a little congested, tonsils small, and no exudate in the mouths of the crypts. Nasal cavities and ears normal.

November 20: I pressed out some foul-smelling exudation from each intra-tonsillar fossa, and next day small lenticular ulcers appeared where pressure had been applied; they healed very slowly, in spite of frequent gargles, mouth-washes, pastilles, &c.

November 24: Swabs taken from the region of the right tonsil revealed streptococci in almost pure culture.

November 25: Dr. Eyre ascertained the presence of a few streptococci in urine removed by catheter from the bladder.

November 27: Evening temperature, 101·6° F.; shivering fit.



Temperature chart from case of streptococcal infection of the throat.

November 28: Opsonic index to *Streptococcus longus*, 0·72; 2·5 millions of autogenous vaccine of mixed streptococci and staphylococci injected.

November 29: Temperature, 102·4° F.; shivering fit.

November 30: Ten cubic centimetres polyvalent antistreptococcus serum (Lister Institute) injected.

December 1: Temperature 103° F.: 1·25 millions of autogenous streptococcus vaccine.

December 2: Opsonic index, 1·5—2.

December 4: 1·25 millions of vaccine.

December 5: Temperature falling.

December 7: Temperature, 99·6° F.; 1·25 millions of vaccine injected.

From this point onward the patient made an uninterrupted recovery.

The interesting features in the case are: (*a*) The very slight throat symptoms and pathological appearances, combined with a definite and otherwise obscure pyrexia. (*b*) The excellent general condition of the patient during the greater part of his illness. (*c*) The appearance and slow healing of the small ulcers caused by the pressure of a wool-covered strabismus hook on the outer surface of the tonsils.

Note by Dr. Eyre: The interesting points from the bacteriological point of view are: (*a*) The isolation of a streptococcus apparently identical with that causing the throat lesion, from the otherwise normal urine—from 10 c.c. of a catheter specimen two colonies being obtained—pointing to the value of urine examination in pyrexial attacks of obscure origin, since pathogenic bacteria are apparently—at times—filtered off and excreted by the kidneys. (*b*) The lack of response on the part of the patient to a vaccine prepared from the throat exudate, in which approximately equal numbers of streptococci and staphylococci were present, and the immediate response to an autogenous vaccine prepared from the streptococcus derived from the urine, unmixed with other organisms.

DISCUSSION.

The PRESIDENT (Mr. Herbert Tilley) added that there was little to be seen in the throat beyond a redness similar to that observable in the throat of a cigarette-smoker. The tonsils were not enlarged, and it was difficult to make up one's mind from mere appearances that the throat could be the source of the general infection.

Mr. DE SANTI asked whether the President considered it an acute infection. He had recently seen a streptococcal case, in a professional man well known in London. There were no symptoms, but cultures taken from the throat showed pure streptococcal infection—*Streptococcus longus*. A bad odour emanated from the mouth, and the man himself felt sure his throat was affected. Two years before he had a retropharyngeal abscess, and had nearly died. He was injected with an autogenous vaccine, but without benefit.

Mr. STEWARD mentioned a boy under his care, aged 9½, who had had four similar attacks in twelve months. He did not examine the throat in the first three. The attacks consisted of general malaise with pyrexia, the temperature running up to 104° F. No other symptoms were present and no other cause could be discovered, but he was always supposed to be going to have an exanthem. When examined in the fourth attack a little spot was found on one tonsil. Dr. Eyre took a culture, found the *Streptococcus longus*, and proceeded to prepare a vaccine; but during the next twenty-four hours the temperature subsided, and the boy got well.

Dr. DAN MCKENZIE, in view of the lack of response to a vaccine prepared from the patient's throat, asked if the streptococcus recovered from the throat had anything to do with the streptococcus recovered from the urine. He understood that various strains of streptococci might have no relationship with each other.

Mr. E. D. DAVIS asked if there was any possibility of it being a pneumococcal throat. There was great variability if the pneumococcus was not encapsuled.

The PRESIDENT replied that he scarcely knew how to answer the question whether it was an acute infection. When he saw the lad, he was particularly free from acute local or general symptoms; he was happy and comfortable, took his food well, and slept soundly. Therefore the illness could scarcely be termed an acute infection. With reference to Dr. Jobson Horne's suggestion as to the value of sea air, the patient was brought from the sea-side, where he contracted his illness. With regard to enucleation, he wished to exhaust every means of getting the boy well without operation. It was difficult to be certain whether the patient got well because of the inoculations of vaccine, or whether convalescence would have been established without that form of treatment.

Tuberculous Ulcer on the Right Vocal Cord in an Elderly Man cured by the Application of the Galvano-cautery.

By HERBERT TILLEY, F.R.C.S.

THE patient applied to the hospital on account of hoarseness; he was being treated for pulmonary tuberculosis. The posterior three-quarters of the right vocal cord was occupied by a shallow ulcer surrounded by pale granulations. By the direct method, three deep punctures were made through the floor of the ulcer with the galvano-cautery and at the one sitting. The ulcer has quite healed and only a slight congestion of the cord is to be seen.

The PRESIDENT said that at present the patient had well-marked physical signs at the back of the right apex and tubercle bacilli in his sputum. He was going to a sanatorium in the course of a week. It was quite easy to use the direct tube with cocaine, and galvano-puncture could be carried out with great accuracy. Of course the indirect method could probably have been used, but he did not think he could have applied the cautery as accurately with it as with the direct method.

Granular Congestion of Left Vocal Cord, probably Specific in Origin.

By HERBERT TILLEY, F.R.C.S.

THE patient is a male, aged 54. First seen, October 18, 1912. He had suffered from hoarseness since childhood; worse in spring and autumn. The last attack was present for three weeks. He had lost 10 lb. during the three months previous to my seeing him. There is a history of syphilis. The left vocal cord was granular and congested and a small superficial ulcer occupied its posterior third. The history and appearances suggested tuberculosis, but pulmonary signs are entirely absent and the ulcer has disappeared under potassium iodide, while the rest of the larynx has improved to the condition in which it now is.

Case of Cyst of the Pituitary Fossa; Operation by the Nasal Route.

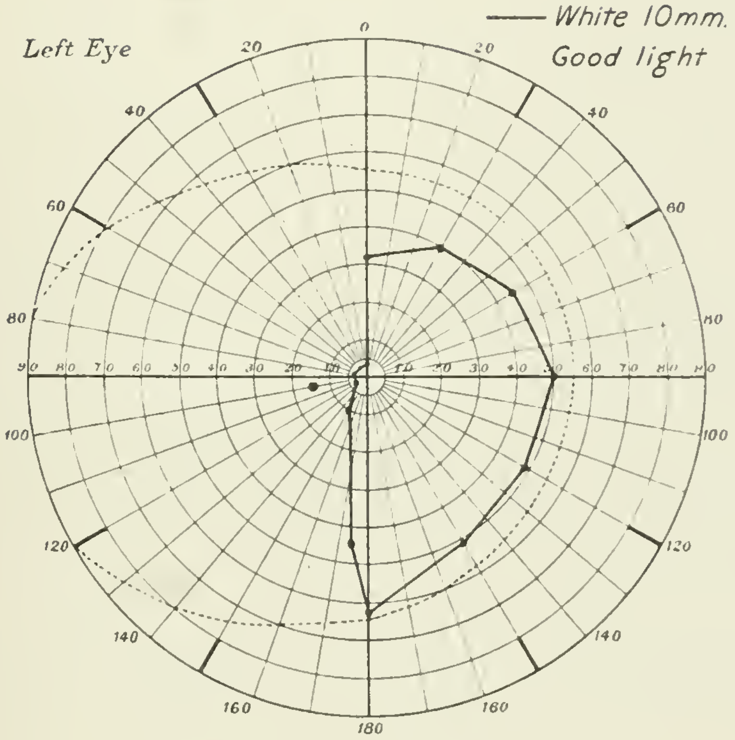
By C. I. GRAHAM, F.R.C.S.

FEMALE, aged 37; admitted to St. Mary's Hospital under Dr. Wilfred Harris on November 8, 1912, for failing sight for eighteen months, temporal headaches, drowsiness, slow mental reaction, and incontinence of urine for several months.

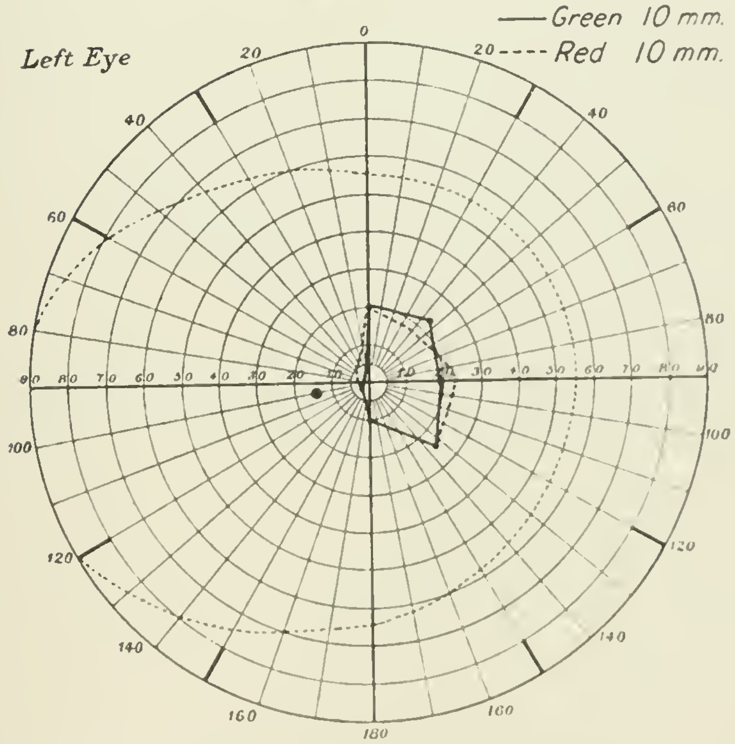
On admission: Articulation good; slow reaction time; drowsy; right temporal headache. Right eye—blind, optic atrophy, pupil shows only consensual light reflex. Left eye—vision present in nasal field, pupil dilated and shows neither direct nor consensual light reflex. Urine normal, 16 to 24 oz. daily; no trace of sugar in urine for twenty-four hours after administration of 7½ oz. glucose. Skiagram shows pituitary fossa flattened out and enlarged. Temperature, 98·4° F.; pulse, 82; respiration, 20.

By November 26 the drowsiness had increased almost to coma; incontinence of urine and fæces; eyesight worse; respirations had slowed to nine or ten per minute. Urotropine (90 gr.) was given by the mouth.

Operation (November 27, 1912): Half an hour before operation morphine (¼ gr.) and atropine ($\frac{1}{150}$ gr.) were injected subcutaneously. A quarter of an hour before operation both nasal fossæ were packed with gauze strips soaked in 1 in 1,000 adrenalin containing 5 per cent. cocaine. Anæsthesia was induced by the intravenous injection of ether solution. The nasal vestibules, the upper lip, and neighbouring skin of the face were painted with tincture of iodine (B.P.) and a sterilized cloth was laid across the lower part of the face, a hole being cut in the cloth to admit of access to the nose. Illumination was obtained by means of a Nernst light reflected from a frontal mirror. One assistant was employed to keep the field of operation free from blood. The incision, which was made through the skin, commenced at the tip of the nose and was carried to the upper lip, dividing in its course the columella and about ⅛ in. of the philtrum, keeping accurately in the middle line. The free edge of the septal cartilage was defined and the skin of the vestibule raised from each side of the septum. It was at this stage that the oozing of blood from minute points caused considerable delay in raising the vestibular skin, but the difficulty was overcome by assiduous mopping; and from this stage to the completion of the operation the hæmorrhage was insufficient to cause inconvenience, regular mopping being all that was necessary. The mucous membrane was easily raised from the sides of the septum and the elevation was carried back to within 1 in. of the posterior edge. A speculum with narrow, 3-in. blades held the mucous flaps aside during the removal of that part of the septum which corresponded in antero-posterior depth with the raised mucous flaps, and in vertical depth with the skin incision, the tip of the nose being firmly upturned by the hand holding the speculum. The mucous membrane over the posterior edge and upper part of the vomer was raised by means of a dental "stopper" which terminates in a single corkscrew turn; the excursion of the instrument along the posterior edge of the vomer was controlled by the



A. S. December 17, 1912.



A. S. December 17, 1912.

index-finger of the left hand in the post-nasal space. Killian's long nasal speculum with flat blades, ½ in. by 4½ in., was then substituted for the smaller instrument, and the vomer was twisted from its attachment to the sphenoid by means of Luc's ethmoidal forceps. As it was found that the middle turbinals encroached upon the mucous membrane tunnel, they were forcibly separated by means of a metal glove-stretcher, with screw attachment on the handles, the blades being inserted into the tunnel. The mucous membrane was then elevated from the anterior surface of the sphenoid so that the ostia of the sinuses were clearly brought into view. The anterior wall and intersinous septum of the sphenoid were removed by means of small blunt hooks and Luc's ethmoidal forceps. The sinuses were symmetrical and there was no bulging to indicate the position of the pituitary fossa. The position of the pituitary fossa was found by taking a line which commences at the junction of the alæ nasi and upper lip, and runs upwards and backwards towards the junction of the pinna with the side of the head, and this line will be found to pass immediately beneath the lower and outer margin of the o bit. A line commencing at the same spot and traversing the lowest part of the cavity of the orbit will be found to encroach upon the optic chiasma. The opening into the pituitary fossa was made by placing a long chisel parallel to the correct line, with the cutting edge against the roof of the sphenoidal sinus, and then cracking the bone by a few gentle taps of a hammer, a mastoid burr with a small head completing the stage. Immediately the bone was removed there was a rush of from 1 to 2 dr. of blood-stained fluid, and when the fluid was removed dura mater was found to be lying against the opening. After enlarging the opening in the bone the dura mater was incised, and as this gave rise to brisk hæmorrhage on the two repeated attempts at exploration, the operation was concluded by swabbing out the area of operation with mops soaked in 1 in 4,000 aqueous solution of mercury biniodide, and then inserting a suture near each extremity of the skin incision, and sealing the wound by collodion and cotton-wool.

Before consciousness returned respirations were 24, temperature 97° F., pulse 100. During the first twenty-four hours after the operation there was great thirst, frequency of micturition, and polyuria (100 oz.). She was excited and garrulous.

The local after-treatment consisted of instillation of hydrogen peroxide into the nasal fossæ, followed by gentle irrigation with normal saline. Sixty grains of urotropine were given by the mouth upon the third and fourth days after operation respectively, then from the fifth day to the seventeenth inclusive 45 gr. were given daily.

December 12 (fifteen days since operation): No incontinence since operation; the patient is practically normal with the exception of the sight, which she thinks has improved slightly. She has been getting up daily since December 10.

The patient left the hospital on December 17, 1912, twenty days after the operation.

Dr. DAN MCKENZIE said that, so far as he knew, this was the first case of the kind which had been operated upon in Britain, and Mr. Graham was to be congratulated upon his success. A fair number of cases had been dealt with successfully abroad. He thought the object of selecting the route for submucous resection was to minimize the chances of infection, and that probably contributed to the success. With regard to the non-recovery of sight, he supposed that to be due to the fact that the damage to the eye had lasted too long.

Two Cases of Laryngeal Palsy due to Nuclear Lesions of the Vagus.

By L. COLLEDGE, F.R.C.S.

Case I.—Patient is a girl, aged 20, who came to the out-patient department complaining of nasal obstruction. No other disorder was noted nor complained of at the time. She was admitted to St. George's Hospital on December 9. She then complained that in addition she had recently had difficulty in swallowing, and her food and drink had been coming back through the nose. Also four days before admission she suddenly noticed loss of vision in the left eye. Condition is as follows: Central scotoma of left eye, vision $\frac{6}{60}$; paresis of left external rectus muscle; paresis of left half of soft palate; paresis of left sternomastoid muscle; abductor paralysis of left vocal cord. Wassermann's reaction is negative.

Case II.—Patient is a girl, aged 7. She was admitted to St. George's Hospital on November 18 for acute mastoiditis, and Schwartze's operation was performed. As the pulse and temperature remained irregular and the wound did not heal satisfactorily a radical operation was performed on November 30. There was no evidence of tuberculosis in the aural discharge. Condition otherwise is as follows: Complete paralysis of left vocal cord: the cord is in the cadaveric position, it is relaxed and sickle-shaped and the arytænoid is prolapsed forwards; paralysis of the left trapezius and sternomastoid; atrophy and paralysis of the left half of the tongue. In addition the pulse has varied between 120 and 146 ever since admission, which may be due to interference with the functions of the vagus. The diagnosis in both cases is a lesion in the left half of the medulla, probably tuberculous in nature.

DISCUSSION.

Mr. ROSE said he had seen a girl, aged 17, who had similar symptoms, but on the right side; a very careful examination was made to find the cause, but with no result. She was kept under observation for two or three months, and during that time she completely recovered. She was taking iodide of potassium, but there was no other reason for supposing she had syphilis.

The PRESIDENT said that of the cases with somewhat similar lesions that he had shown, one was syringomyelia, and the other in an adult who had paralysis of the trapezius, sternomastoid, left vocal cord, and left side of the palate. This case belonged to the same category as the cases described by Hughlings Jackson and Morell Mackenzie years ago, references to which would be found in the *Proceedings of the Laryngological Society*. Some of these were probably due to pachymeningitis involving the membranes at the base of the skull and the foramina where the cranial nerves made their exit.

Congenital Membrane of the Larynx.

By GEORGE W. BADGEROW, F.R.C.S.Ed.

THE patient, a boy, aged 6, was sent to me complaining of weakness of voice. On examination of the larynx a membrane is seen situated at the anterior commissure stretching between the cords, an opening only left in the posterior part of the glottis. There does not seem to be any interference with respiration. Should treatment be undertaken?

DISCUSSION.

The PRESIDENT said that years ago Sir Felix Semon wrote of one or two cases in which the congenital laryngeal web was associated with coloboma iris. The latter condition was not present in this boy.

Mr. A. J. HUTCHISON said that many years ago he saw a child who was under the care of the late Mr. Baber, and who had a congenital web. It was operated upon by the late Sir H. T. Butlin and the result was very unsatisfactory, as though breathing was somewhat better and the child took more exercise, there was no improvement in the voice and she could not yet speak above a whisper. She could not take more active exercise than golf.

Dr. DONELAN said that the most important factor in the case was that there was no interference with respiration. While that was so he thought that it would be better to avoid any treatment. As the general experience appeared to show, the treatment of these webs was always most difficult and unsatisfactory. He thought the only reliable way of affecting a speedy cure was that followed in Dr. Hill's case, in which the result had been most satisfactory.

Dr. FITZGERALD POWELL said the consensus of opinion in the meeting seemed to be that the case should be left alone at present. If operation were found necessary for the safety of the boy, he thought the method he had used for stenosis of the larynx would be the best. A high tracheotomy was performed, and through this opening it would be possible to incise the web; having done this, suitable silver plugs—such as were mentioned by Mr. Lack in Cheyne and Burghard's "Surgery"—were inserted upwards into the larynx above the tracheotomy tube and lying on it. These plugs were used continuously for a period of six to twelve months and the result in the cases of stenosis in which they were used was excellent. The tracheotomy wound was allowed to heal, the larynx remaining quite patent.

The PRESIDENT said it would be interesting if, in the light of this discussion, Dr. Hill could arrange to show his case again. If in removing the web two raw surfaces were made, unless means were taken to prevent the opposing granulations from uniting, the original evil would be reproduced. He had had considerable experience of these cases of recurrent papillomata of the larynx, and in the inveterate cases it might be advisable to consider splitting of the larynx and inserting the "wing" obturators, so that one could deal directly and very frequently with the first signs of recurrence and without the necessity of general anæsthesia.

Dr. DUNDAS GRANT, while agreeing that the case was best left alone for the present, said the chief anxiety would be lest the child had one of the exanthemata, in which case the laryngitis would be apt to be suffocative. If tracheotomy should have to be done, then plugs could be used, as mentioned by Dr. FitzGerald Powell, or those devised by Dr. Thost, of Hamburg.

Mr. BADGEROW, in reply, thanked the members for their opinions, and thought it wise to leave the case alone for the present.

Case exhibiting Lingual Gymnastics.

By E. A. PETERS, M.D.

MISS A., aged 35, is able to pass her tongue behind the soft palate, where the Eustachian tubes and inferior turbinals are recognized thereby. It has been said that certain cases of suicide have been effected in this way.

DISCUSSION.

Dr. Syme said he had seen one such case in a girl, the subject of atrophic rhinitis. It might be that she had gradually brought on her condition by working her tongue back into the nasopharynx to allay the irritation. He thought the hard palate here was shorter than usual, and the soft palate seemed to have developed excessively.

Dr. Dan McKenzie did not agree that there was any deficiency in the hard palate, and there was no nasal intonation. He believed the condition was due to the mobility of the tongue. He had seen cases of atrophic rhinitis in which the patient had learned to get rid of the crusts by means of the tongue.

The President said he had been told that this condition was not very uncommon, and that people had been known to commit suicide by pushing the tongue upwards and backwards into the post-nasal space. [Dr. Donelan: It was a common method of suicide in slave-ships.]

Multiple Papillomata of the Larynx.

By E. A. Peters, M.D.

L. G., aged 9, has suffered with dysphonia for three years. Two years ago her tonsils were removed to relieve croup. There are several elongated papillomata of a pinkish-grey colour growing in the region of the false cords. Is this case suitable for the direct or, alternatively, the laryngotomy method?

DISCUSSION.

Mr. Steward agreed with Dr. Horne as to the advantage of operating by the direct method, and persevering until the papillomata were got rid of. In this child, aged 9, they probably would not recur very quickly. He still had cases under supervision on whom he had been operating for six to eight years, and one of them had passed the last year without need of operation. He would not advise Dr. Peters to do thyrotomy in this case, as he would find it practically impossible to keep the larynx open sufficiently long, and there was great danger of subsequent stenosis of the larynx. He had seen extreme stenosis of the larynx follow thyrotomy.

Mr. Hope said that during 1911 there was a case under Dr. Hill at St. Mary's Hospital on whom he (Mr. Hope) operated by the direct method. The child wore an intubation tube during four days, and then went home. This was done four times during the year, and was very little trouble. The intervals seemed to be getting longer.

Dr. FitzGerald Powell said that he thought it very necessary that a tracheotomy should be performed in children with these multiple papilloma before proceeding to their removal, either by the direct or indirect methods. It protected the child from dangers that might arise, such as spasm or œdema, and the opinion has been held that it had a curative effect in resting the larynx.

Dr. DAN MCKENZIE said he showed a girl at the Section[1] who had had tracheotomy performed, as she had cyanosis, and that wound was very useful in subsequent treatment. Papillomata were taken away regularly by the direct method, which afforded a confidence in dealing with them that could not have been felt in the older days. The was no recurrence of the growths two years afterwards. He asked if members had tried carbonate of magnesium internally for the condition, as dermatologists were using it for papillomata of the skin.

Mr. ROSE said he attempted to cure two patients by calcined magnesia administered internally. One of the patients declared she was better, but he was certain that was not so. In the other case, neither the patient nor he thought there had been any result. The age of one of the patients was 40; no attempt had been made to remove the papillomata before, though her symptoms lasted from her sixth year. Therefore, those who hoped a child would grow out of the condition had an uncertain foundation for their belief.

Dr. DUNDAS GRANT considered that repeated operation was the best method, and after removal of the bulk of the growths, cauterization. He had used an alcoholic solution of salicylic acid (not salicylate of soda), as he was convinced it tended to prevent re-growth. But it was absurd to find fault with such a caustic agent because it did not cause a large cauliflower growth to shrivel up at once. Tracheotomy was often necessary, but that was not a "specific" for papillomata of the larynx. He had seen a case which was tracheotomized in early childhood for papillomata of the larynx, in which the patient came under his care at her twenty-first year. He cleared out the papillomata and removed the tracheotomy tube. The patient experienced great pleasure in drawing a breath of fresh air through her nose for the first time.

The PRESIDENT spoke of one boy who attended his hospital every two or three months, and who was said to have been operated upon forty-three times. Certainly he had removed hundreds of papillomata from this boy on different occasions. They had recently crept up the side of the pharynx on to the soft palate, and below had come out through the old tracheotomy opening and formed not only a mass of granulations around the tracheal opening, but there was a smaller mass growing on the larger mass. The local infectiveness of these warts in some subjects made them seem almost intractable to treatment. In the patient referred to, he had operated several times by the direct method and was satisfied that every visible papilloma had been removed, then a 20 per cent. solution of salicylic acid in collodion had been applied, but the growth rapidly recurred and had not been checked by the internal administration of arsenic.

---

[1] See *Proceedings*, 1911, iv, p. 80.

Tumour of the Left Antrum.

By E. A. Peters, M.D.

The patient was shown on March 29, 1912.[1] On that occasion various opinions as to its nature were expressed. Before the operation a trocar inserted through the inferior meatus became impacted in a solid growth. The upper lip was dissected from the canine fossa, which was incised, and revealed a solid mass of soft, cancellous, bone-like tissue. By means of a gouge an attempt was made to reproduce an antrum, which was then opened in the usual way into the inferior meatus. Unluckily the piece of growth received for microscopical examination was thrown away, so that it is impossible to exclude the diagnosis of a slow-growing carcinoma. The tumour was noticed three years ago and expanded the antrum in all directions, except the palate. The outer wall was very hard.

DISCUSSION.

Dr. **Kelson** said he was interested in this case as, from time to time, cases had been shown before the Section resembling leontiasis ossium and those bony growths of the maxilla common on the West Coast of Africa, yet differing somewhat from both of these. These cases, when brought up, had been thought by some to be due to syphilis, and by others as due to some other micro-organism. They had all been bilateral, but not symmetrical. Dr. Peters's case seemed like that condition limited to one side, and on looking into the nose of this patient he saw that the inferior turbinate on that side was much enlarged, as in his own case. The bone, he believed, would be found to be very brittle. The condition was not malignant, and he believed good results would follow operation.

Mr. **Howarth** said that the case did not at present appear to be malignant, but he would like to know whether it was translucent and what the X-ray picture revealed. He had seen a similar case, which was quite translucent, and which was thought to be a cyst in connexion with one of the teeth; it was outside the antrum, and at the operation it proved to be what was thought. In operating through the labio-gingival fold, the cyst, which was the size of a pigeon's egg, was shelled out without opening the antrum at all. The anterior wall of the antrum had been pushed back so far by the cyst that there was practically no antrum on that side. This present case might be similar. He did not think the turbinate was large, but it had the appearance of being pushed into the nasal cavity.

---

[1] See *Proceedings*, 1912, v, p. 129.

Dr. SYME said the case reminded him of one shown before the Scottish Otological and Laryngological Society, which was thought by some to be leontiasis ossium, while others regarded it as a cyst. When Dr. Adam, who showed the patient, operated, there was found to be, on both sides, a firm fibrous growth which had undergone osseous changes. Both antral cavities were involved.

Dr. PETERS, in reply, said that the case was shown last year with somewhat similar appearances, and he had operated in the interval. On transillumination the antrum was dark, and there was slight enlargement of bone. An incision was made into the canine fossa last April and an attempt made to fashion a new antrum out of the solid mass of soft bony material. There was no trace of a dental cyst. On talking over the matter with Mr. Westmacott, he thought it might be a case of hyperplasia of the antrum in which vacuolation had not occurred in the maxilla, and that there had been retrogression of the bone and the formation of solid material. In one case Mr. Westmacott scooped out the central mass of the bone to the zygomatic arch. One of that gentleman's cases dated back twenty years, and the patient recovered absolutely.

Unusual Form of Syphilitic Laryngitis.

By C. W. M. HOPE, F.R.C.S.

MRS. A., aged 39, was shown at the November meeting.[1] She was suffering from hoarseness of twelve months' duration. Having been resident in Norway seven years she was shown for diagnosis. ? Leprosy. The uvula, both arytænoids (especially the left), epiglottis, and both ventricular bands showed white, solid swellings; palate was not anæsthetic, and healed scars were seen on the posterior pillars of the fauces and on the post-pharyngeal wall. Cords were normal. No ulceration present. Patient felt very lethargic and disinclined to do anything entailing the least exertion.

The Wassermann reaction proving positive, I gave her, on November 14, 1912, 0·6 grm. of salvarsan intravenously. There was a marked reaction, lasting ten hours. Temperature up to 102° F., vomiting once. On December 11, 1912, patient reported herself as feeling much better generally; hoarseness had all gone. On examination the only swelling in the larynx was a slight reddish enlargement of the left arytænoid. The uvula was still swollen, though much less. A second dose of 0·6 grm. of salvarsan was given, and a reaction as at the first injection occurred.

---

[1] See *Proceedings*, p. 27

DISCUSSION.

Dr. LIEVEN (Aix-la-Chapelle), responding to a request for his views and comments on this case, said he noticed that reaction was said to have occurred each time after giving the salvarsan. He did not consider it at all necessary for such reaction to occur, especially in tertiary syphilis. Reaction occurred for two reasons: (1) from the spirochætæ and their toxins, and (2) from the toxic reaction of the arsenical preparation. Every individual had his own limit of tolerance, and by proceeding cautiously that limit need not be exceeded. In Germany, 0·5 grm. for an initial dose was the rule, and his own practice was to give not more than 0·35 grm. in the first injection. No reaction should, as a rule, be produced in tertiary syphilis, because there were not enough spirochætæ present. For secondary syphilis it was advisable to eradicate most of the organisms by means of mercury and finish the case off by salvarsan. A dosage which was toxic for a patient once would assuredly be so again; therefore, if a marked reaction occurred a smaller dose should be given on the second occasion. Dr. Lévy-Bing, at the Hôpital St. Lazare in Paris, having excluded syphilis of the nervous system by a cytological examination of the cerebrospinal fluid in a series of prostitutes with primary and secondary syphilis, gave them injections of salvarsan. About a month afterwards, on re-examination of spinal fluid lymphocytosis was present in every case, so that there had certainly been a neurotropic effect produced by salvarsan. It was vital to avoid the accidents which led to encephalitis hæmorrhagica, and that could be done by limiting the doses which produced no reaction. The dose of 0·6 grm. given in the present case he regarded as rather large. Even the most experienced syphilologists had their bad cases with quite moderate doses, because one could never foretell the individual tolerance. At Liège, Professor Troisfontaines reported the death of an otherwise healthy girl, aged, he believed, 23, after a dose of 0·5 grm. She died on the second or third day from hæmorrhagic œdema of the brain. He had seen several patients rendered drowsy or even unconscious from the drug on the second or third day. In his opinion, such cases were due to a temporary œdema of the brain. A lady patient, aged 35, suffering from secondary syphilis, had twenty mercurial inunctions, and subsequently he gave her an injection of 0·5 grm. It was, however, too much for her, for on the second day he was urgently called to her and she was found to have bilateral paralysis of the abducens, with hallucinations, of which the former cleared up in four days whilst the latter lasted a week. He was always glad when the third day from the injection had passed. With regard to the permanency of the effect of salvarsan, that had been largely solved by Professor Bayet, of Brussels, who treated several large series of syphilitics in the "Hôpital St. Pierre." They were treated without mercury, and got up to five intravenous injections for a period extending in general over five to six weeks, and the clinical result had been very good, whilst the effect on the Wassermann reaction proved to be largely negative. His impression was that by the combined treatment of mercury and salvarsan relapses during the secondary period, particularly relapses on the mucous membrane of the tongue and pharynx, had become very rare. That was very important, because such treatment must lessen the amount of domestic infection. He knew altogether of five cases of death reported after giving salvarsan, but he was of opinion that a number had occurred in private practice which were not recorded, and the reason for the silence could be well understood. That applied to this country as well as to others. It was the duty of medical men to perfect their knowledge of effective and safe treatment of the disease. One should not go on introducing arsenic into the system just because the Wassermann reaction did not become negative, because it must be left to the future to decide the final effects, if any, of salvarsan on the body, especially as we knew comparatively little as yet of the rate of excretion of the arsenic from the body.

Mr. HOPE replied that when he showed the case in November, one diagnosis was atypical myxœdema, and another was laryngeal hyperplasia, the Wassermann reaction not then being known. He showed the patient again because her general condition had so markedly improved. He agreed that her palate was still much the same as before. He had treated fifty to sixty cases of laryngeal and nasal syphilis with salvarsan, and this was the only one in which there had been a reaction, with temperature or vomiting. But all the other cases had been treated with mercury first, and in all of them he had given the same dose, except for children, for whom it was 0·2 or 0·3 grm.

Case of Dysphagia presenting Unusual Features rapidly remedied by Treatment.

By W. JOBSON HORNE, M.D.

THE patient, a man, aged 49, when he came to the hospital last December had suffered pain on the right side of the throat for one month. The pain had extended to the right ear. He thought that he had been losing flesh during that time, which could be readily accounted for by the fact that he had not been able to take solid or even liquid food. He had had no cough, and there was no history of tuberculosis in the family. Some twenty years ago he had lues venerea —he was at sea, and the treatment was rough but not thorough. At the time of writing these notes a Wassermann test had not been done, the sputum had not been examined, and inasmuch as the dysphagia was confined to the throat itself, and had rapidly improved under treatment, œsophagoscopy had not been performed.

When first seen the only noticeable feature was a marked deviation of the tongue upon protrusion to the right side. No glands were palpable in the neck. Possibly the right vocal cord did not move as freely as the left. The right side of the base of the tongue was greater than the left side. But apart from these, there was no gross lesion to account for the gross symptoms. Iodide of potassium and perchloride of mercury were prescribed, and the patient was rapidly enabled to swallow. The case is shown with a view of clearing up any doubts about the cause of the dysphagia.

Dr. JOBSON HORNE stated that the dysphagia appeared to be entirely pharyngeal and due to the swelling at the base of the tongue, which he regarded as a gumma. The rapid diminution of the swelling and the accompanying rapid relief of the dysphagia under antiluetic treatment tended to confirm those views of the case.

Case of Tuberculosis of Pharynx and Larynx.

By DAN MCKENZIE, M.D.

THE patient is a young man, suffering from phthisis pulmonalis. There are tuberculous ulcers on the tonsils and on the posterior pharyngeal wall which are remarkably painless. The larynx is of interest in that it shows fixation of the left half.

Laryngological Section.

February 7, 1913.

Mr. T. MARK HOVELL, Vice-President of the Section, in the Chair.

Treatment of Sarcoma of the Neck (secondary to Tonsil) by Seleniol Injections.

By C. W. M. HOPE, F.R.C.S.

H. H., MALE, aged 25, came to Golden Square on September 7, 1912, with swelling of right tonsil; two months' history of enlargement. Tonsil was size of a hen's egg, hard to the feel, and had two ulcers on the anterior surface

September 17: Removed by enucleation *viâ* the mouth, after a preliminary laryngotomy. Microscopical report: Mixed-celled sarcoma.

November 11: Slight induration felt beneath upper end of right sternomastoid.

December 6: As mass was increasing, extending from base of mastoid process to upper border of thyroid cartilage, and head movements were becoming limited, it was cut down on. The whole of the tissues were indurated, and a gland was removed lying very deep in front of the transverse process of the second cervical vertebra. It was broken down and necrotic. Wound healed by first intention.

December 13: Microscopical report: Sarcoma undergoing necrotic changes.

December 14, 17, 21, 24, and 28: 3 c.c. of seleniol injected into the mass on each of these dates.

January 10, 1913: The deep mass has completely gone; only thickening present in scar, which is freely movable. Patient feels and looks very well; has gained 5 lb. in weight in the last two weeks.

DISCUSSION.

Mr. DE SANTI said he did not think the method used in the case had done any real good. He had not tried the seleniol method, but he had occasionally tried other vaunted and new substances for inoperable malignant growths, such as Coley's fluid, but had not found any of them of any use at all. In the case shown by Mr. Hope the tonsil had been enucleated, and he did not see why the glands also were not removed at the same time, or shortly afterwards, whether enlarged or not. He had had eight or nine such cases, and there had been recurrence in all of them within periods ranging from three months to four years. As a rule these cases were hopeless, and he feared this patient would go from bad to worse.

Mr. BETHAM ROBINSON did not agree with such a strict laying down of the law as Mr. de Santi had given, as there were cases of sarcoma of tonsil, clinically, which had different histological appearances; those of the soft lymphadenomatous type did very well from the point of view of the operation. Even if the growth did recur, which was highly probable, the interval might be considerable, therefore he would not agree that such cases should not be touched. He agreed that the cases where there was much infiltration in the neck, without marked definition, were hopeless, and would rapidly recur.

Dr. BRONNER asked if any member had tried antimeristem, which had been much boomed on the Continent, particularly by Dr. Schmidt, of Cologne.

Mr. HARMER, answering Dr. Bronner's question, said that he had obtained from Dr. Schmidt material to treat a case at St. Bartholomew's Hospital of extrinsic carcinoma of the larynx. Eight to ten doses were prescribed for this patient. He had rises of temperature after each dose, and his neck was much more swollen than before. Eventually suppuration took place, and he got a fungating tumour of the neck. He believed the treatment had increased the rate of growth very materially. He understood the treatment had been used at the Cancer Hospital, but the results had not been very favourable.

Mr. HOPE, in reply, said that he did not bring the two cases forward as cured, but the first man had an enormous mass in his neck when he started to inject him, and it would have been hopeless to attempt to remove the whole mass. The mass subsided to some thickening beneath the skin incision. He started injecting him again on his second visit, and the growth was again smaller. He thought he should now have the neck opened and the glands removed. He also believed the Cancer Hospital had been using seleniol for some time, but he had been unable to find out the results.

Laryngeal Tumour treated with Seleniol.

By C. W. M. HOPE, F.R.C.S.

A. B., MALE, aged 53. Loss of voice for several months, with increasing dyspnœa. When admitted to hospital in November, 1912, had marked stridor, voice very hoarse, and could not lie down in bed.

Right arytænoid and ventricular band were replaced by a large red, smooth swelling, not mobile; left arytænoid and cord also swollen, but much less so; movable. Neither cord could be seen, and there was practically no glottis. Diagnosis made of swelling above a malignant ulceration. There was some definite thickening on the right side of the neck over the right ala of the thyroid, and a small, hard gland could be palpated.

As patient seemed so ill and in bad condition laryngectomy was not advised. Injections of seleniol (3 c.c.) were made three times a week into the deep tissues near the right ala of the thyroid cartilage. After the second injection patient felt great relief, all dyspnœa disappeared, and he has since been able to lie down and sleep the night through. He feels much improved generally, and looks better. Weight is stationary.

On January 15, 1913, by direct method, a large fungating mass was seen involving the right side of the epiglottis on its laryngeal surface, the right arytænoid, and extending down through the glottis.

On January 29, 1913, the fungating mass had largely disappeared, leaving a large, fairly clean ulcer, and at the lower border the cricoid ring could be felt bare.

Patient has now a much larger glottis, and the posterior part of the left cord can be seen by indirect examination.

Seleniol is an electrolytic colloid of the metal selenium, and may be injected subcutaneously, intravenously, or directly into the tumour. There is absolutely no toxic effect, and the growth is said to either absorb or liquefy.

Pedunculated Growth of Nose.

By W. H. KELSON, M.D.

THE patient, a man, aged 72, came complaining of watery discharge and difficulty in breathing through the nose. There was a pedunculated growth taking origin just below the anterior end of the right inferior turbinal.

DISCUSSION.

Dr. PEGLER said that although one could not feel sure what such a case was until examined microscopically, he thought this would prove to be a mucous hypertrophy of the inferior turbinal, with an exceptionally narrow pedicle. He commended the exhibitor for showing such an interesting growth before removal and hoped there would be a section of it at the next meeting.

Dr. KELSON replied that he considered the condition rare. He proposed to remove the growth, and would show a section of it at a subsequent meeting.

Syphilitic Laryngeal Stenosis with Calcification of the Fascia of the Neck.

By T. B. LAYTON, M.S.

THIS patient was formerly shown at the Laryngological Society at its fifty-first ordinary meeting on June 2, 1899,[1] and the following is copied from the proceedings of that meeting: "(Shown for Mr. Charters Symonds by Mr. Steward.) The patient, a woman, aged 32, complained of loss of voice and difficulty in breathing, and gave the following history: When a child she had an abscess on the right side of the neck, and at about the same time she became deaf. About ten years ago (i.e., in 1889) swelling and stiffness of the neck began, and this has gradually increased since that time. The present attack of hoarseness commenced three months ago. The patient is very deaf, the skin is pallid, the bridge of the nose is broad and flattened. The eyes and teeth are normal. Just behind the angle of the jaw on the right side is a large scar. The whole of the structures in the front of the neck are hard and matted. There is great thickening around the hyoid bone and thyroid and cricoid cartilages, and these structures appear to be united in a dense, hard mass. There are several enlarged glands in the submaxillary region, and lower down in the neck are several very hard nodules, one, particularly hard, being situated in the right sternomastoid muscle. The soft palate and pharynx are much scarred, and are adherent to one another. The upper opening of the larynx is red and swollen, and there is ulceration on the right ventricular band."

In the subsequent discussion Sir Felix Semon suggested that the condition might be specific, and Mr. Steward agreed. This view has since been confirmed; firstly, because the Wassermann reaction was positive in May, 1912, and secondly, because eye lesions characteristic of syphilis have appeared in the interim. Mr. H. L. Eason examined her on January 2, 1913, and reported thus: "Patient has diffuse corneal opacity in both corneæ, in the substance of the cornea, from old interstitial keratitis, and there is extensive choroiditis in the macular region in both eyes. No evidence of iritic adhesions."

---

[1] *Proc. Laryng. Soc.*, Lond., 1898-99, vi, p. 107.

The impression of Mr. Steward is that the external condition in the neck is unchanged since he saw her thirteen years ago. The present condition differs, however, in two ways from the description given above :—

(1) The bridge of the nose is no longer "broad and flattened," suggesting that there was then active inflammation which has since become quiescent.

(2) There is now no sign of any active disease in the larynx. A proper examination cannot be made of this organ by the indirect method, because the epiglottis is curled round on itself and is nearly touching the scarred posterior wall of the pharynx. There is, however, no redness, swelling, or ulceration either of the epiglottis or of that part of the arytænoid region which can be seen. Direct examination of the larynx is impossible because the contraction of the neck prohibits a sufficient extension of the head.

She now suffers from some dyspnœa, which varies considerably from time to time. Thus she said on December 20 that it kept her awake at night-time, but by the time that she was taken into the ward for observation she was much better, and the night nurse reported that except for asking for a second pillow she had no difficulty in breathing, and slept well. Salvarsan (0·6 grm.) was given intravenously in May, 1912, but does not seem to have made any difference to the condition. The Wassermann reaction in January, 1913, was still positive, but was less marked than in May, 1912.

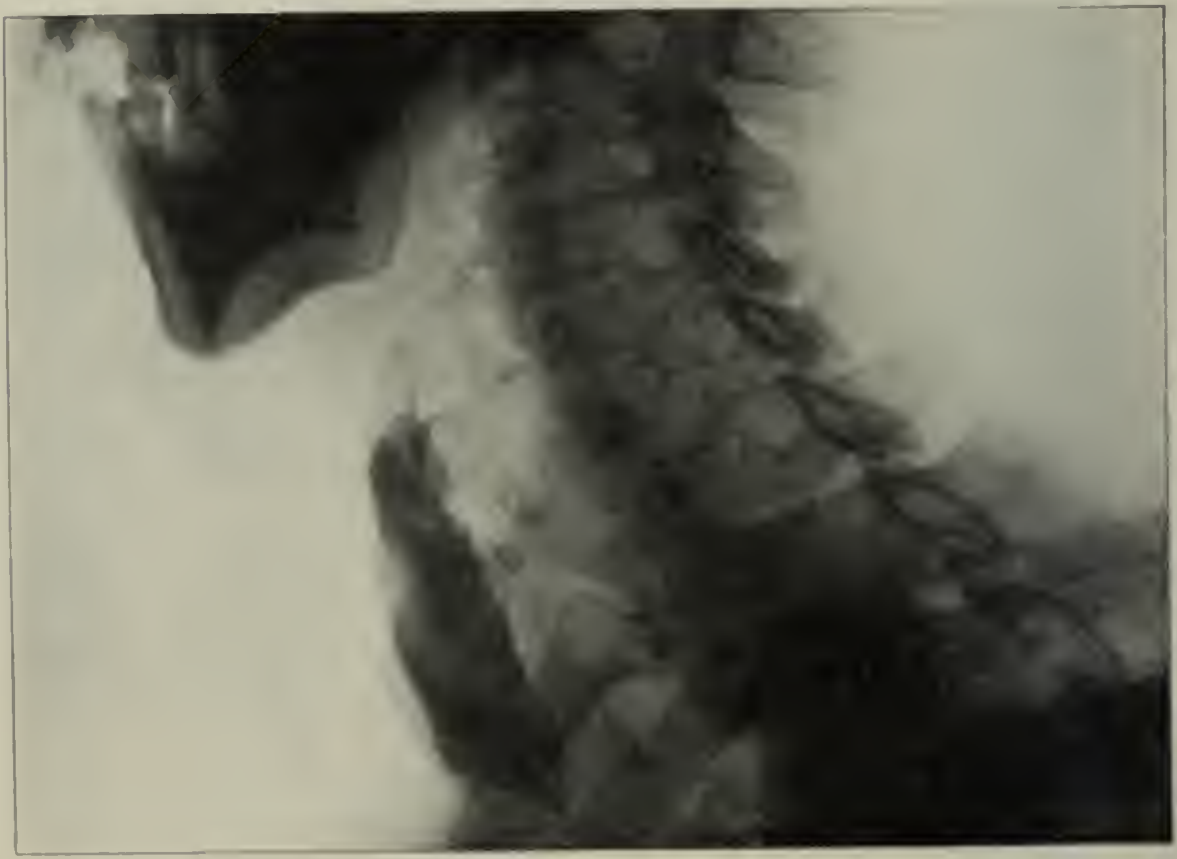
Will the case progress so much as to need a tracheotomy? and if so, is there any means of finding out whether the contraction is limited to the larynx or extends right down the trachea?

DISCUSSION.

Mr. BETHAM ROBINSON said he saw the patient at about the same time as she was under Mr. Charters Symonds, for she was also under his care at St. Thomas's Hospital, and then there was some question as to whether it was a syphilitic case. He did not think it could now be doubted that it was syphilitic, and the positive Wassermann reaction proved it. The extreme hardness about the hyoid bone and below the jaw was much the same as fifteen years ago, but there was now more thickening about the right sternomastoid, and the nodules seemed to be in the fascia over it; the laryngeal appearances were little changed. The question arose now, as it did then, should she have tracheotomy done? He took her into St. Thomas's Hospital for that purpose, but it was declined, and she might still decline. There seemed now to be a greater mobility of the larynx.

Mr. Waggett said the right arytænoid was considerably swollen, and the ventricular band was fixed. On the left side the cord was nearly fixed, but the ventricular band made active movements, indicating articular fixation.

Mr. Barwell suggested that an X-ray photograph would clear up the question of whether it was calcification or fibrous tissue. He agreed that a good view of this larynx could be obtained by the indirect method.



Skiagram to illustrate Mr. Layton's case of calcification of the fascia of the neck.

Dr. H. J. Davis pointed out that in Dupuytren's contraction the bands became so hard as to suggest calcification, and the hardness in this case he did not regard as more than cicatricial, but an X-ray photograph would at once settle the matter.

Mr. Layton replied that if tracheotomy was suggested thirteen years ago and the patient had done without it, that was a reason for staying one's hand now. He proposed to have a skiagram taken.[1] The condition of the right arytænoid varied from time to time, and he had seen it do so during the last three or four months.

[1] This has now been done by Mr. E. W. H. Shenton. The mass in the sternomastoid throws a dense shadow, as is seen in the accompanying reproduction.

Webbing of the Vocal Cords in the Anterior Commissure due to a Shot Wound.

By JOHN F. O'MALLEY, F.R.C.S.

F. M., A BOY, aged 11. Sixteen weeks ago he was standing near a brick wall with his right side towards it. His brother, who was cleaning a toy gun, which contained an "Eley 14" cartridge, fired it off by accident against the wall close to where the patient stood. Several of the pellets ricochetted off the wall and lodged in the patient's neck. He expectorated some blood immediately, and became hoarse soon after the accident, and his voice has remained altered since then. He came into the Evelina Hospital a few days ago under the care of my colleague, Mr. Clogg, who has kindly transferred him to me. An X-ray examination shows four pellets on the right side and one on the left. The latter is opposite the transverse process of the seventh cervical vertebra, and to reach this position it must have traversed the larynx from the right side, and in doing so has damaged the vocal cords. A laryngeal examination shows the anterior third of both cords united by a web or band of connective tissue. The movements of the cords behind the adhesion, and of the arytænoids, are quite good.

DISCUSSION.

Mr. BARWELL said that some years ago he had a similar case in a man as a result of a gunshot injury in the Zulu War. He had almost the same kind of adhesion between the vocal cords. As the aperture was ample for breathing, nothing was done. That was the case here also, so he would not advise treatment from that point of view, and he did not think that there was any certainty of improving the voice by operation at the present time.

Mr. WAGGETT thought it undesirable that the boy should be allowed to grow up with such a voice. A plastic operation, after laryngo-fissure, entailed no danger, and even if unsuccessful could not leave the voice worse than it already was.

Dr. FITZGERALD POWELL did not think that an operation was indicated in this case at the boy's present age, and advised waiting until his voice had changed, and he had grown older. At the present time there was plenty of room for breathing, and though his voice was bad, there was a danger of making it much worse if he were operated on.

Dr. H. J. DAVIS would not do anything in this boy's case at present; his larynx was very small and undeveloped. But if anything were done he thought it should be through the bronchoscope by dilatation. He thought, with Dr. Powell, that the voice might be worse after such an operation as thyrotomy, which was a very crippling one.

Dr. MILLIGAN said he would operate by one or other of the methods suggested, because if left until the boy's voice was fully developed there would be considerable atrophy of muscles.

Dr. LAMBERT LACK expressed the view that operations on the larynx in children were usually failures, and it was better to defer operation until they had grown up. Not only might operation permanently impair the voice, but it might cause stricture of the larynx.

The CHAIRMAN (Mr. Mark Hovell) said his view was that it should be left for a time, to allow the larynx to develop.

Mr. O'MALLEY replied that the relatives were anxious that something should be done, but he wished to have the opinions of his colleagues first. He did think of putting him under a general anæsthetic, and with a bronchoscope taking a portion of the web away, touching the site with nitrate of silver. He thought that would make a coagulum which would last some days, and after two or three days he had intended to do a similar touching up in the hope that it would not unite across. In view of what had been said he proposed to hold his hand.

Adhesion of Uvula and Soft Palate to Posterior Pharyngeal Wall in a Girl, aged 12.

By JAMES DONELAN, M.B.

NEITHER parent nor patient has any recollection of any throat affection. Was sent to Italian Hospital by school inspector on account of imperfect nasal respiration. The father was a healthy man until two years ago, when he developed tuberculosis. He is now in an advanced stage of the disease. The mother is a healthy woman. Four healthy children older than this. No miscarriages. Patient has chronic otitis media on right side. Suggestions as to probable origin and most suitable treatment requested.

DISCUSSION.

Dr. DONELAN added that since he examined the case a fortnight ago and hooked a bent probe around the uvula it had become detached. It had also shrunk to a third of its former length.

Dr. McKenzie asked what was the experience of members in operation for adhesions between the soft palate and the posterior pharyngeal wall. He had operated twice on such a case and found it unsuccessful. He saw a case in which Dr. Grant removed part of the bony palate and after the operation brought the uvula forward by suture and attached the suture to one of the incisor teeth; the result was the best he had seen. Another method was to put two long rubber tubes in, one through each nostril, bring them out of the mouth and attach them outside.

Mr. de Santi mentioned a successful case shown at the Society some years ago in which there was complete adhesion between the remains of the soft palate and the posterior wall of the pharynx. Mr. W. G. Spencer detached the adhesions with scissors and a raspatory. There was such severe hæmorrhage that transfusion was necessary, but he proceeded with the operation by turning forward on itself all the soft parts and transfixing the rolled-up soft parts with silver sutures, the ends of which were passed through the mucoperiosteum of the hard palate and the stitches were left to cut their way out. There was previously no aperture between the nasopharynx and the oral pharynx, but, afterwards, a large forefinger could be passed behind. Two years later she came under him (Mr. de Santi) with complete re-contraction, but no re-adhesions, and an ordinary Eustachian catheter could not be passed up into the nasopharynx. Shortly after Mr. Spencer's case, he (the speaker) had an exactly similar case of his own and expected severe hæmorrhage, but there was no great bleeding. Though that was ten years ago re-contraction had not occurred and there was an excellent opening, and he had had three or four similarly treated since. In all of them some re-contraction had occurred but no re-adhesion, and in every case a sufficient opening was obtained for all post-nasal discharges, &c., to come down into the mouth. Some operators advocated attaching the sutures to the front teeth instead of the palatal muco-periosteum, but this was a minor detail and the credit of the operation was due to Mr. Spencer.

Mr. Betham Robinson mentioned a case shown to the Society some years ago in which he passed a bent sheet of lead round the detached soft palate, with silks at each corner, the upper silks going through each nostril and the lower through the mouth. The plate was kept in position for a fortnight, and it did very well. He had not seen the patient for several years now.

Dr. Milligan said it was very difficult to prevent such cases re-adhering. He recently had a case of complete adhesion to the soft palate and had operated upon it twice. He first used a rubber drainage-tube to pull the palate forward, but the patient said he had been uncomfortable for days. In two years he came back with an aperture which would only admit a pencil. He then passed tapes of lead through the nose and round the upper lip, keeping them in situ for ten days. The result was fairly good, but he saw the patient again eighteen months ago, and though the aperture was now somewhat larger, the result was still poor.

Dr. FITZGERALD POWELL said that some years ago several of these cases were shown at the Society's meetings—he remembered Mr. Robinson's case—just about that time; he had three or four cases himself in which he had operated, and in one particularly he had an excellent result which persisted. It was the retraction of the palate which was the difficulty; it was not so difficult to prevent the adhesions. He had used large rubber tubing with silk through the nose, which could be taken out to clean. They were kept in for a month or two. He thought the use of the tubing should be persisted in for a long trial to obtain a good result.

The CHAIRMAN remarked that grafting had not been referred to. The best tissue for that purpose was a child's prepuce. A young and popular actress came to him about nine years ago with some slight nasal obstruction, which at the most required cauterization. A few months later she came with a considerable amount of stenosis in the nasopharynx, and inquiry revealed the fact that she had been operated upon for nasal obstruction. The soft palate had been severely lacerated, and in consequence, except in the centre, was adherent by almost the entire length of its edge to the posterior wall of the pharynx. Her voice was considerably affected. Subsequently, the soft palate was separated and a portion of a child's prepuce, from which the skin had been removed, was sewn to the lower part of its edge on each side. When seen about nine months ago there was still a very good opening and she had a fairly good voice.

Dr. DONELAN, in reply, was glad that his case, though it no longer presented the features it was desired to exhibit, had led to such a very interesting discussion. As regards the difficulty of dealing with these adhesions after operation, he had had last year a case in which the right posterior pillar and part of soft palate were adherent to the pharyngeal wall. After prolonged antisyphilitic treatment he had divided the adhesions and maintained the separation by extension of the patient's tooth-plate on the affected side. This was used for nearly six months and the trouble had not recurred. He had often thought that a special plate, curved well up behind the choana, with room in it for the folded palate, would be a very useful apparatus in such cases.

Combined Tonsillotome-tonsillectome.

By JAMES DONELAN, M.B.

THE tonsillotome is that of which the working model was shown here on November 1.[1] In view of the present vogue of instruments with blunt blades for the purpose of enucleation in giving the instrument its definite form, it has been made more strongly and fitted with an accessory blunt blade. When the blunt blade has been well driven home by the thumb in the ordinary way, a screw can be readily attached and the enucleation completed by a pressure, which, it is claimed, is at once greater and more under control than in Sluder's instrument. The shape of the lunette is also such that on tightening up the screw a scissors action is obtained from the closure of the angles between its edges and those of the blade. This instrument has also a sharp blade for ordinary tonsillotomy. In adding this device for the convenience of those who favour this method of enucleation the exhibitor does not wish to be understood to share their views. The tonsillectome was found to work well in the few cases in which it has been tried. The model instrument shown on November 1 is now shown again as a tonsillotome.

---

[1] See *Proceedings*, p. 11.

Dr. WATSON-WILLIAMS showed the latest pattern of his tonsillectomy forceps, an instrument which he originally devised because his thumb was too weak to use with comfort the ordinary Sluder pattern with a blunt blade. The blade being driven home by the grasp of the hand, it would readily separate the tonsil from its bed, or cut through the most fibrous tonsil if so desired. It was especially serviceable in rapidly enucleating tonsils in children under short anæsthesia by chloride of ethyl or even nitrous oxide gas.

Sluder's Guillotines.

By H. J. DAVIS, M.B.

AN account of these instruments was given at the last meeting of the Section. The exhibitor has been asked to exhibit them again, together with other instruments exhibited by others who have designed them with the same object in view—i.e., enucleation of the tonsil with the capsule intact.

DISCUSSION.

Mr. HOPE said he did not like the handle of the Sluder instrument, because it got in the way when operating. The old handle was preferable.

Mr. FAULDER said he used nothing for this purpose except the old Mackenzie instrument, with Heath's strengthening. He had done the operation about 900 times.

Mr. O'MALLEY said he did not like the slotted ring: the instrument he showed had a recess instead of a slot, and that was filled with lead. The hæmorrhage he had from the operation now averaged only three drachms.

Mr. HORSFORD said Messrs. Mayer and Meltzer had made him a modification of Heath's instrument, by making the shaft stronger and the cutting point thinner. He tried it a few days ago on half a dozen cases, and in each there was complete enucleation. That was not only the simplest method but the quickest, as they were done with one cut. Success depended on pressing the tonsil forward against the angle of the jaw.

Dr. DAN MCKENZIE considered that the perfect tonsillotome had not yet been devised; there would always be modifications to suit different persons. He did not think there was anything better than the old Mackenzie instrument. When using a blunt instrument one crushed and bruised the tissues, and he considered that cutting was better as well as cleaner. He asked whether those who preferred crushing had watched their cases afterwards in respect to the cicatrization. He had seen nasty cicatrices after the procedure.

Dr. MILLIGAN said he had seen Sluder operate, and he had watched a house surgeon at one of the Boston hospitals use the snare, and he came away impressed with it; although only a junior he did the operation with great skill and finish. Sluder's method seemed somewhat brutal in respect to the force used.

Mr. WAGGETT advocated the use of the snare for enucleation. The operation was performed in a bloodless field if two snares were employed after the manner recommended by Guisez. The double operation occupied about ninety seconds, and failure to accomplish complete enucleation was very rare.

Dr. DUNDAS GRANT said that when the upper pole of the tonsil extended far up, its enucleation was considerably facilitated by means of a small incision cut through the uppermost part of the anterior pillar into the bed of the tonsil. This was best accomplished by a small rectangular knife, sharp on the edge and blunt at the tip. When this was done the upper pole was generally enucleated quite easily by means of the guillotine. The removal of this part of the tonsil was of special importance in cases of recurrent peritonsillar abscess.

Dr. KELSON asked whether it was really necessary to make the operation so easy that first-year students or nurses could be relied on to perform it. In discussing the removal of tonsils it should always be remembered that some were exceedingly easy, but others difficult, and these latter were those that chiefly interested us. The extremely rapid enucleations one sometimes heard of referred to the former.

The CHAIRMAN said he still used the Mackenzie instrument. If a tonsillotome was so thin that it bent, he would scrap it and buy a new one, as an instrument in good condition was rigid.

Serrated Adenoid Curette.

By H. J. Davis, M.B.

This instrument was designed by Dr. Leslie-Davis, of Philadelphia, U.S.A.; it is thin, flat, and very sharp, and the cutting blade is serrated in a series of curves. The exhibitor has used the instrument which was presented to him by the inventor, and when used in the way the designer intends, it answers its purpose remarkably well. The instrument is inserted behind the palate, then rotated rapidly on its vertical axis, quickly withdrawn, and the growth is removed *in toto*.

Swelling in the Right Upper Jaw in a Boy, aged 8.

By H. J. Davis, M.B.

The tumour is either due to a dental cyst or a sarcoma; it has been growing steadily the last few months. The right side of the face is opaque to Heryng's transilluminator. The tumour appears to be bony in parts, and fluctuates (?) in others. The jaw-bone is expanded and the palate bulged inwardly.

DISCUSSION.

Mr. Robinson said there was no doubt it was a cyst. On pressing on the surface of the palate one found definite elasticity, and from the irregular condition of the teeth it was probably a dentigerous cyst with a tooth inside, rather than a dental cyst, which was usually associated with root inflammation. He did not think it was connected with the antrum.

Dr. Davis replied that it was now larger and denser than it was a fortnight ago. Three years ago he exhibited a similar case; it was operated upon by the house surgeon in the out-patient department, and the boy developed osteomyelitis of the jaw, and nearly died. There was always some risk that these cases might become septic when dealt with by the buccal route. The whole of that side of the face was dark on transillumination.

Mr. Robinson said he had removed a dentigerous cyst from a child of the same age, and in the same position, and he uttered the caution that the antrum was probably a very small one, and was overlapped in front by the cyst, and it would be easy to enter the antrum.

Dr. FitzGerald Powell said that as the antrum was dark on transillumination it should be explored before an operation was done, as there might be a solid growth in the antrum and not a cyst.

Case of (?) Rodent Ulcer of Orbit.

By H. J. Davis, M.B.

Operation has been performed and the eye removed. The outer wall of the nasal cavity is freely exposed, showing the fronto-nasal duct, the ethmoid cells and the outer surface of the superior and middle turbinate bones.

The patient is a woman, aged 45, who is under the care of my colleague Mr. Bishop Harman, who performed an extensive operation on the orbit. The upper eyelid is adherent to the posterior orbital wall. The inner orbital plate has been removed, showing the strictures as above described in situ. There is no disease in the nasal cavity.

[*Note.*—March 7: The patient was operated upon a few days later. The large cavity entered was full of pus, and the disease was reported upon as tuberculous.]

Lupus of the Tongue.

By H. J. Davis, M.B.

Patient is a newspaper boy, aged 14. Both nostrils are filled with lupoid growth. The palate, pharynx, posterior nares, the epiglottis, and the skin, all show typical lupoid patches. The boy is in no inconvenience whatever, but he is very pale and looks ill.

Lupus of the tongue is rare. It is proposed to excise the granular patch on the tongue, to curette the nares, and to treat the palate and epiglottis with lactic acid, 50 per cent., and orthoform, and to give injections of tuberculin.

Dr. Peters said the case showed the different characteristics according to the situation: Hypertrophic lupus on a moist surface, such as in this case on the palate; an almost atrophic condition when it affected a dry spot—the anterior nares in this case; and warty lupus on a thickened surface—the friction surface of the tongue.

Case for Diagnosis.

By T. JEFFERSON FAULDER, F.R.C.S.

F. C., AGED 24. History: Swelling in the nose and of the left side of the face noticed for three years. Watering of the left eye for about the same period. No other symptoms complained of.

Present condition: Epiphora of left eye; slight fullness of the left cheek; mucous membrane in the floor of the left nostril raised by a swelling which is intensely hard.

DISCUSSION.

Mr. JEFFERSON FAULDER added that on transillumination the left side of the face was absolutely dark; the right side nearly so. Skiagrams showed a diffuse thickening of the left superior maxilla and, to a less extent, of the right side also. Attempts made to explore the tumour with a trocar in various places through the nostril proved its extreme hardness. He did not contemplate interfering surgically with the tumour itself as it had no definite boundaries. But as the patient had permanent obstruction of the nasal duct, he seemed to be running a risk of infection of the lachrymal apparatus, and the question was whether the lachrymal sac should be removed, or whether some other way of relieving the epiphora could be found.

Mr. ROBINSON thought it a chronic inflammatory condition of the bone (osteo-sclerosis), spreading widely, and probably it was of the leontiasis ossea type. Iodide of potassium should be given.

Dr. DONELAN regarded it as a case of old inflammatory thickening of the bone. The patient said he had had rhinorrhœa since childhood. There was a similar condition on the right side, but it had not grown up from the floor of the nose so as to obstruct the lachrymal duct. He had had a case of acute rhinitis, followed by separation of part of the intermaxillary bone. Years later there was a swelling on the other side, like that in this case. It was removed by reflecting the coverings and gouging out the bone. He thought that a good result as regarded respiration could be obtained in this instance, but it was unlikely the epiphora would be cured without dilatation or other treatment of the canaliculi.

Mr. DE SANTI agreed with Mr. Robinson's view, and said he would not operate.

Dr. PEGLER thought the bilateral character, as shown by examination of the opposite fossa, indicated a form of leontiasis.

Dr. DAN MCKENZIE suggested that the nasal duct be opened above the inferior turbinal in the outer wall of the nose, as von Eicken had advised. He hoped to show at the next meeting a case in which the result of that was fairly good.

Case of Chronic Pemphigus.

By E. A. Peters, M.D.

Mr. K. has always had difficulty with his digestion. He usually takes a milk, egg and cereal diet. There is no history of syphilis. Three years ago I removed the middle turbinals, which had been converted into a mass of polypi. Three months ago a doctor removed a small polypus with a view to relieving a non-purulent catarrh of nose and throat. This was abating when several small vesicles appeared ⅛ in. in diameter on the pharyngeal wall and, later, on the palate. Soon, however, larger vesicles were seen on the mucous membrane of the lower lip, side of the nose, lower eyelids, wrists and neck. Dr. Adamson pronounced the condition as one of chronic pemphigus. Under arsenic, rest, and small doses of opium the condition has improved, but the palate has again been attacked by large vesicles measuring ¾ in. in contradistinction to the early small blebs. A bacteriological examination revealed an occasional white staphylococcus, probably due to skin contamination.

DISCUSSION.

Dr. Scholefield asked if the patient had been taking a drug before this condition arose. It was similar to a condition he saw follow the taking of a mixture of iodide of potassium and antipyrine; it occurred in the usual situations of pemphigus.

Dr. H. J. Davis recommended orthoform: he had such a case where nothing else did any good, and the insufflations not only gave marked relief to the patient's pain, but the vesicles disappeared under this treatment.

Dr. Peters replied that he did not think the patient had been having iodide of potassium. He was not under his charge at the time when there was an operation for the removal of the polypus; a month later small vesicles had formed on the pharynx and palate. The new vesicles became larger as the disease extended outwards. He had used orthoform when the deeper regions of the throat were affected, to relieve pain on swallowing. He would use orthoform in this case, and see if the healing could be hastened thereby.

Exhibition of Specimens from a Case of Suppuration of the Antrum due to Aspergillus fumigatus, with a short Note of the Case.

By Douglas Harmer, F.R.C.S.

(1) Three tubes showing secretion at different stages.
(2) Tube showing growth on maltose-agar (Sabouraud's medium).
(3) Films showing mycelium.
(4) Films showing spore formation.
(5) Photographs.

Patient was a lady who had suffered for many years from hay-fever. In November, 1912, a severe cold commenced after motoring in an open car. For five weeks after there was a persistent discharge of mucus from the right side of her nose, and occasionally a thick membranous cast from the back of the throat. The latter was of brownish-yellow colour and had the appearance of wet blotting-paper. It was not offensive. She had violent attacks of sneezing and was wakened by it once or twice each night. There was never any bleeding.

On examination the right side of the nose was found completely blocked by œdematous mucous membranes. After application of cocaine and adrenalin the œdema subsided to some extent, but a good view of the nose could never be obtained. Further it was noted to vary at different times. The nose seemed to contain an inexhaustible supply of slightly yellow mucus which could not be removed by syringing. The post-nasal space was also full of mucus, and the pharynx contained a quantity of frothy saliva. The right antrum was dull.

The general health was bad, and she had the appearance of being poisoned. She complained of occasional headaches and neuralgic pains around the right eye. Her nervous system had suffered, and she could not sleep well at night. Temperature and pulse were normal. The digestion was somewhat deranged.

Under general anæsthesia an intranasal opening was made into the antrum. On washing out, no discharge was seen for a time. After about a pint of lotion had been used small lumps of brownish membrane began to appear. This continued until six pints had been employed, when the lotion again ran clear. The difficulty in dislodging the membrane was a striking feature of the case.

The material was submitted to Dr. Gordon, who reported that films stained by Gram showed a few staphylococci, and cultures on ordinary agar grew staphylococcus colonies only. In examining secretions from the upper respiratory passages, however, it is always our custom to make blood-agar plates as well, and on these there was a copious growth of *Aspergillus fumigatus* in forty-eight hours at 37° C. On re-examining the original secretion mycelium was discovered, seen best in unstained films. It was subsequently found that the fungus grew best on Sabouraud's maltose-agar. Unlike the common moulds, it can grow at body temperature as well as in the cold.

For the next month the antrum was washed out twice a day and quantities of mucus dislodged. Occasionally a few pieces of membrane appeared together with small gritty fragments like little bits of shell. Various solutions were tried, including salt, peroxide of hydrogen, permanganate of potash, and tincture of iodine, but none of them seemed effective. The peroxide, if used persistently, proved intensely irritating, even when used in five-volume strength. Injections of alcohol to 75 per cent., and a suspension of bismuth subnitrate in oil, were also tried with no better success; in fact, the patient's general condition became, if possible, worse. After four weeks' treatment, iodine was given internally, the sodium salt being employed, commencing with 2-gr. doses and rapidly increasing to twenty-three times a day. The antrum was now washed out as often as possible with five volumes peroxide of hydrogen. Forty-eight hours after commencing this treatment a great quantity of the membrane came away. From this time onwards there was never any difficulty in dislodging the discharge, which steadily lessened in quantity and grew whiter in colour. At the end of ten days all the discharge had ceased. The syringing was continued for three weeks more, when the antrum suddenly became quite clear to transillumination. By this time all the œdema had disappeared, together with the symptoms noted above. The general health rapidly improved, and the patient has now remained well for a fortnight.

DISCUSSION.

Dr. H. J. DAVIS said he had just seen a lady whom he had operated upon, and who had had some trouble in the antrum for years. The whole antrum was filled with polypi. He sent specimens to Dr. Bernstein for report, as he thought the case was malignant. Dr. Bernstein reported that the tissues examined were not malignant, but that macroscopically and microscopically the polypi were invaded by a fungoid growth which he considered saprophytic in character.

Dr. PEGLER said he had met with this fungus in the external auditory meatus. It formed a soft mass, varying in colour from white to black, causing much pain, and perforating the drum membrane.

Dr. BRONNER said that this was a fairly common affection of the external auditory meatus and often overlooked. Was it possible that the patient referred to had infected the nares from the ear by the finger-nails?

Mr. WAGGETT reported a case in which, some five months after a successful radical operation upon the maxillary antrum, the patient returned with that cavity completely filled with a dark green, firm, leathery mass. This was removed with considerable difficulty, and proved to consist of the mycelium and hyphæ of a fungus. The exact species for the moment escaped the memory of the speaker. The patient, a man, aged 40, reported that serious nasal symptoms appeared shortly after an occasion on which he had worked upon some mouldy hay in a barn.

Mr. HARMER replied that he could find only three other cases recorded in the literature in which the disease was in the antrum. It was more common in old abscess cavities in the lung and in the ear, but apparently in the nose it was rare. This patient never had anything the matter with her ears.

Specimens of Artemia salina from the Nose (a New Form of Sea Serpent).

By DOUGLAS HARMER, F.R.C.S.

A LADY who had suffered for many years from rhinitis had been in the habit of using douches of various kinds. Recently she had used a solution of a patent sea salt which had been recommended by a friend, as it was said to possess special healing properties. After the use of this lotion she noticed intense irritation in her nose on several occasions, accompanied by attacks of sneezing. She became convinced that something was creeping about inside her nose, and on washing it out discovered the two sea monsters shown. She was anxious to know whether they were common inhabitants of this region.

At first sight it seemed improbable that they ever came out of the nose at all, but the patient was sure of the fact. The history was so remarkable that the specimens were sent to Dr. S. F. Harmer at the

Natural History Museum, who was able to confirm her diagnosis. He reported as follows:—

"Some months ago it was accidentally noticed, in the Botanical Department of this Museum, that a solution of this sea salt, left to itself for some weeks, became tenanted by a very interesting crustacean, *Artemia salina*. The experiment was repeated in the Zoological Department by Dr. W. T. Calman, with the same result. Dr. Calman published a note on the subject in *Knowledge* for June, 1911. The culture which he started on May 9 is still in existence five months later, and has reached the second generation. The cold weather will, however, probably kill off the survivors. *Artemia salina* is well known as an inhabitant of brine pools, where it flourishes when the salt has reached a high degree of concentration. I presume that during the preparation of this salt some of the eggs get dried off with the salt and remain capable of developing when they are put into water under suitable conditions. You may confidently express the view that your patient's theory of the origin of the artemia was a correct one. Dr. Calman points out that one of the specimens carries eggs, and that the solutions used would thus appear to have been some weeks old."

Dr. DAN MCKENZIE considered it showed great diagnostic acumen to have discovered this monster in the discharge, and to have traced it to its lair.

Ulceration of Pharynx and Larynx.

By HAROLD BARWELL, F.R.C.S.

BOY, aged 13; aphonia three years, no dysphagia. Extensive ulceration of pharynx, larynx and nasopharynx; soft palate and epiglottis largely destroyed.

Mr. BARWELL added that the Wassermann test was found to be positive, and this cleared up the diagnosis. He considered it very difficult to distinguish the nature of the chronic granuloma causing the ulceration in these cases, and he doubted whether one could make a diagnosis solely by inspection.

Laryngological Section.

March 7, 1913.

Mr. HERBERT TILLEY, President of the Section, in the Chair.

Larynx removed (Post Mortem) from a Man who had worn a Tracheotomy Tube for Eighteen Years.

By HERBERT TILLEY, F.R.C.S.

E. P., AGED 58, a short and spare man, consulted me some eighteen years ago for difficulty in breathing. This was of an urgent nature, especially on slight exertion. Laryngoscopic examination showed the vocal cords in the adducted position, and some fullness of the arytænoid regions. No lesion was discovered in the chest nor in the central nervous system. His general health was good. Tracheotomy was performed under local anæsthesia. and for eighteen years the patient did his work satisfactorily. He has been twice shown at the Laryngological Society or Section, and no one has been able to throw any light on the nature of the original lesion in the larynx. Last month he died of "blood poisoning," and I was only able to secure the larynx.

I am indebted to Mr. T. W. P. Lawrence, the Curator of the Museum in University College Hospital Medical School, for the following description of the larynx :—

"The larynx shows mal-development of the cricoid and left arytænoid; the latter is only about half the usual size. The posterior lamina of the cricoid is very narrow transversely, and has a big fissure in the mid-line, which is filled up with membrane continuous with that of the trachea. From the narrowing of the posterior lamina there

---

ERRATUM.—In the last number, p. 88, the title of Dr. Davis's case should be "Case of Rodent Ulcer of Orbit," the query having been inserted in error. The *Note* at the foot of the case was also inserted in error; it should have been placed after the previous case, that of "Swelling in the Right Upper Jaw" on p. 87.

results a falling together of the alæ of the thyroid, and the angle they form anteriorly is very acute. The entire right half of the cricoid is less developed than the left; as a consequence, the right arytænoid is placed more forward than the left, and the epiglottis tilts downwards and to the right. The arytænoid cartilages are very vertical, and their mesial surfaces in contact, but the narrowing of the rima appears to depend more on the falling together of the alæ of the thyroid. The crico-arytænoid joints appear to be normal."

DISCUSSION.

The PRESIDENT (Mr. Herbert Tilley) said the conditions of the larynx were very rare, and he doubted whether there was a record of anything like it in the literature of laryngology. Curiously, another patient came to him (the speaker) within three weeks of the one from whom this specimen was obtained and with identical symptoms, and this patient was still alive and suffered no inconvenience beyond that due to the tracheotomy tube which he had worn for eighteen years.

Sir FELIX SEMON said he had never seen anything like the present case, and he doubted whether an exactly similar one had ever been described. He once had to write a chapter on malformations of the larynx and went through the literature for the purpose, but did not remember anything of this kind. Twenty years ago, however, he showed at the Clinical Society of London a curious case of congenital malformation of the larynx and trachea, with a diverticulum of the œsophagus, occurring in a young woman.[1] In that case the thyroid cartilage was more prominent than usual in women, and it was found, on palpating the larynx, that the two halves of the thyroid were not united in front by cartilaginous union, but merely by a firm ligamentous connexion. The record stated that the finger-tip could be easily introduced into the fissure resulting, and the right half of the thyroid distinctly overlapped the left. The laryngological examination showed a striking picture, the right half being higher than the left, and a remarkable feature was that one could look right down into the right ventricle of Morgagni, and that the right vocal cord was visible along its entire breadth. He would ask every member of the Section, when they came across cases of malformation of the larynx, not to allow them to pass unrecorded and unexhibited. It was most desirable that they should find a place in the literature of their speciality. At present their number was quite small.

Dr. W. HILL assumed that Mr. Tilley regarded the condition as a congenital malformation, and not merely the result of disuse or of inflammation, though the notes contained no definite statement in that sense.

---

[1] See *Trans. Clin. Soc. Lond.*, 1892, xxv, p. 298.

The PRESIDENT replied that he did not know exactly how to explain the relationship between the symptoms and the laryngeal condition. It was difficult to understand that a man should have lived for the time this patient had—he came under notice when aged 40—without trouble, and then suddenly develop symptoms. He remembered him coming to the London Throat Hospital with considerable œdema of both arytænoid cartilages. It was obvious that the man required a prompt tracheotomy, and this was done under local anæsthesia. The mal-development of the larynx was probably congenital, and some inflammatory conditions arose leading to the necessity for tracheotomy. There was no history of traumatism.

Killian's Apparatus for Suspension Laryngoscopy.

By WALTER HOWARTH, F.R.C.S.

BY the use of this apparatus an admirable view is obtained of the larynx and of the deep pharynx. It possesses several points of advantage over the ordinary direct method, the principal ones being that the field is considerably larger and that the surgeon has both hands free.

DISCUSSION.

Dr. BROWN KELLY said he had used the apparatus for papilloma, lupus, and tuberculosis, and to obtain a good view of the post-cricoid region. It not only gave a very extensive view, but also allowed one to get nearer the parts. The chief consideration was that it enabled the most delicate operations in the larynx to be carried out by those who had never used the laryngeal mirror.

Dr. WILLIAM HILL said that he had tried Killian's suspension apparatus in a case where he wished to remove a growth near the anterior commissure, and in order that the instrument might be inserted in the correct manner to get the best available view, he had got Mr. Davis, who had had considerable experience with this method, to come and insert the spatula. Unfortunately the method failed just in the class of case where it promised to have advantages over the ordinary hand instrument. Mr. Davis found that in this case, as in many of the others that he had examined, it was not possible to get a view of the anterior third of the glottic region. He (Dr. Hill) then inserted his large slotted direct laryngoscope manipulated by hand, and there was not the smallest difficulty in maintaining a prolonged exposure of the anterior commissure. Such an experience naturally did not impress him very favourably with the scope of this new method. It was, of course, a great advantage to avoid the strain on the left hand in the ordinary method which during prolonged operations sometimes brought on temporary cramp, and if one were called on to employ it frequently he would not be surprised if it produced an occupation neurosis. Brünings's counter-pressure attachment, however, was brought forward to avoid this, and it possessed the same advantage as the suspension apparatus, in that it left both hands free if necessary. No doubt this new apparatus gave a splendid field of view for operations in the arytænoid region and pyriform fossæ, but it seemed to have a limited field of usefulness and failed in just those cases where it was most wanted. He had recently been shown by Down Bros. a modification in the attachment of the spatula so that the pull could be adjusted and made to act nearer the distal extremity of the spatula, but he had not as yet tried this pattern, which he was told had been employed at Guy's Hospital, and he rather gathered that it originated in the Throat Department at that institution. He believed that improvements in this apparatus would be made in the near future so as to increase its field of usefulness, more especially in bringing well into view the anterior commissure in all cases. It would be interesting to know if others had been more fortunate or whether they had experienced similar disappointments to his own in difficult cases.

Mr. EDWARD DAVIS said that the case referred to by Dr. Hill was a difficult one, and the man had a small mouth. He was a syphilitic patient, with stenosis of the larynx, and one could not see more than the arytænoid cartilages and a very small part of the vocal cords. He believed Mr. Howarth would show an apparatus in which there was a method of pressing the larynx backwards into the pharynx, enabling a better view to be obtained of the anterior portion of the cords. So far he had not obtained a good view of the anterior commissure. He understood that Killian, in his writings, admitted that in his earlier cases he could not obtain a good view of the anterior commissure, even when the larynx was pressed backwards into the pharynx.

Mr. LAYTON said they had not yet introduced modifications of the instrument at Guy's Hospital. Their instrument came from the same firm as that of Mr. Howarth. The apparatus might be made to fit on the left side of the table, as at present the upright was in the way if any external operative treatment became necessary. This was well brought out in the case of a girl upon whom he operated quite recently for papilloma, necessitating a hurried tracheotomy.

The PRESIDENT said he had not used the instrument, but he hoped it would enable one to see the anterior commissure. It was just the anterior third of the cords which was so difficult to operate on by either the indirect or the direct method. He thought with Dr. Hill that with the direct tube and the patient's head a little bent forward, or with someone pressing up the larynx, an excellent view of the anterior commissure could be obtained. Hence, he had not yet met with the necessity for the suspension apparatus, but assumed that it would relieve the strain on the operator's left arm, which was a very real trouble, especially in a muscular patient, and this might occur even when he was deeply under an anæsthetic.

Sir FELIX SEMON said Killian looked at it from the point of view of the importance of being able to use *both* hands, and the operator was not encumbered as in the case of the direct or the indirect method, by having his left hand engaged in holding either the mirror or the handle of the tube during the whole of the contemplated operation.

Mr. WAGGETT found the instrument especially valuable in the examination of the hypopharynx and pyriform fossæ.

Mr. HOWARTH said that at present his experience with the instrument was not great. It seemed to him to have some mechanical defects, and the instrument makers were collaborating with him in introducing some modifications which he hoped would prove advantageous. He had not been able to see the anterior commissure in all cases, but by the use of modified spatulæ and the counter-pressor suggested by Albrecht the anterior ends of the cords could usually be seen. He had, however, recently had a case of a very muscular subject where the anterior commissure was not seen until the ordinary direct method was used. The chief advantage of the apparatus was the wide and free view to be obtained of the posterior and lateral parts of the larynx, and of the deeper parts of the pharynx. He thought that the advantage of having both hands free was one which was not to be despised.

Piece of Broken Tracheotomy Tube removed from the Right Bronchus.

By WALTER HOWARTH, F.R.C.S.

THE patient came up to hospital and asked for a new tracheotomy tube. It was noticed that his old one was broken, and as he had some cough and blood-stained expectoration an X-ray photograph was taken. The specimen was removed under cocaine anæsthesia.

Papilloma of Soft Palate.

By WALTER HOWARTH, F.R.C.S.

THIS case was shown at the December meeting after a large fibroma had been removed from the soft palate.[1] The present condition had arisen since that date. It was interesting to note that a small papilloma had been removed from the base of the uvula last July.

[1] *Proceedings*, p. 37.

DISCUSSION.

Mr. BARWELL doubted the diagnosis of papilloma, though from one inspection he would not be too dogmatic. The growth seemed to be very massive, and to be infiltrating the tissues, and he thought that it would prove to be malignant.

Dr. LOGAN TURNER said he also considered the condition might be malignant, though the question of tuberculosis entered his mind. It was, however, rather rapid for tuberculous disease.

Dr. BROWN KELLY also doubted whether it was papilloma. Last session Mr. Lack[1] showed a case of so-called papilloma of the palate in which there was a similar doubt. Histologically it proved to be papilloma, although clinically it seemed to be malignant.

Mr. HOWARTH, in reply, said that the diagnosis was made from the clinical appearance, he had only seen the patient that day and had not time to have a microscopic examination made. In reply to Dr. McKenzie, he said that he had submitted sections of the previous tumour to Mr. Shattock who pronounced the growth a fibroma. He proposed to remove the present tumour and would bring microscopic sections to a future meeting.

Laryngectomy subsequent to Tracheotomy for Epithelioma of the Larynx.

By DAN McKENZIE, M.D.

THE patient is a male, aged 52. Laryngectomy was performed seven weeks ago. The interest in the case from the operative point of view lies in the fact that tracheotomy had been performed a fortnight before the larynx was removed. Thus the typical operation with the suturing of the whole tracheal margin to the skin could not be readily adopted. However, in order to avoid the dangers of an open trachea in the lower part of the neck wound, the upper end of the trachea was closed by catgut sutures, the lower margins of the lateral skin and flaps were sutured to the posterior margin of the trachea, and the whole, or nearly the whole, of the lower transverse incision was left open and packed lightly with gauze. The result was satisfactory. By the time (ten days after operation) the tracheal sutures had given way and the upper end of the trachea began to gape, the upper part of the wound had become isolated from the lower. By these means the pharyngeal discharges were prevented from reaching the trachea during the whole course of the convalescence.

---

[1] *Proceedings*, 1912, v, p. 14.

The wounds have healed with little or no inflammatory reaction (excepting a stitch abscess in front), and this I ascribe to the facts that all the teeth were removed (the patient was the subject of pyorrhœa), and that the feeding tube was kept in the œsophagus for sixteen days.

Respiration is now effected through the upper end of the trachea. The original tracheotomy wound has been allowed to close, but the patient still wears a rubber tube in the upper end of the trachea.

The specimen of the larynx removed from the above case shows the growth extending vertically from the middle of the left ventricular band to the level of the cricoid cartilage, and involving the left side of the larynx chiefly. Diagnosis of epithelioma before operation by microscopic examination (Dr. Wyatt Wingrave).

DISCUSSION.

Sir StCLAIR THOMSON said that from examination of the specimen it was clear that laryngo-fissure would not have got beyond the disease without scooping out the soft parts on both sides to such an extent as to produce practical stenosis. It was a most suitable case for laryngectomy—too far advanced for laryngo-fissure, and not too extensive for excision of the larynx. But Dr. McKenzie, in removing it, did not split the larynx first. No harm had come from that in this particular case, but it would be well for those beginning this work to be advised beforehand to split it first and look inside, for he had known more than one case which, after removal, turned out to be syphilitic and not malignant. Another reason was that in a case he had recently, he fully intended to do laryngectomy, but he afterwards congratulated himself on having split the larynx, because although at first it looked a most suitable case in regard to the larynx proper, he found the disease had spread below the cricoid on to the first two rings of the trachea, and invaded the partition between the trachea and the œsophagus, and so the case was useless for laryngectomy. He therefore closed it up, and simply left in a tracheotomy tube.

Dr. D. R. PATERSON agreed with Sir StClair Thomson's remarks about splitting the larynx. He had a similar case in which he found that the back wall over the cricoid was very considerably affected. He finished the operation there, and put in a tracheotomy tube, and the patient was still alive and had very fair comfort. But if he had gone on, the removal would necessitate extensive dissection, and he did not think the patient would now be alive. Another point was that in those cases calling for laryngectomy in which the patient had a short neck, the plan adopted by Dr. McKenzie of putting in a tracheotomy tube for ten days was admirable, because it fixed the trachea to the skin wound much better. There was a great tendency for the trachea in short-necked people to retract.

Dr. BRONNER said that some years ago he saw a case in which a patient had had tracheotomy performed, and it was intended to remove the larynx. He saw a big growth which he regarded as carcinoma entering the larynx; the growth, however, was growing from the posterior wall of the pharynx, and had covered the glottis, so that the patient could not breathe properly. The larynx, however, was found to be normal.

Dr. DAN MCKENZIE, in reply, said he was much interested in the remarks made in regard to splitting the larynx, but while it was true that splitting the larynx enabled one to see the extent of the growth, it was possible to imagine that one might be deterred, in certain cases, from proceeding to laryngectomy after splitting the larynx by a fear that the growth had extended beyond a point from which it could well be removed by laryngectomy. As time went on bolder measures were attaining success, and he thought that if one adopted a radical attitude in those cases, that was the line along which progress would be made. In this case he had formed no plan in advance, but took things as they came, proceeding by a more or less intelligent opportunism. The question of syphilis had been settled before operation. He wished to express his thanks to Mr. E. Waggett for many valuable hints regarding the after-treatment.

Cystic Distension of the Lachrymal Sac; Operation on Nasal Duct in the Nose (West's Operation).

By DAN MCKENZIE, M.D.

THE patient is a woman, aged 32. She has been suffering from ethmoiditis for some years. Four months ago, after the removal of polypi from the left side of the nose, she noticed a swelling at the inner canthus of the left eye. The swelling corresponded in situation with the lachrymal sac. It was tense and fluctuating, and could be emptied into the nose by steadily pressing upon it.

On November 28, 1912, West's operation was performed. A flap of mucous membrane, with the base posteriorly, was raised from the lateral wall of the nose at a level between and in front of the anterior ends of the middle and inferior turbinals. With a gouge the naso-lachrymal bony canal was broken into and the membranous nasal duct exposed. The nasal duct was then opened up as high as the lachrymal sac. Lachrymal probes, which formerly met with obstruction in their route towards the inferior meatus, now passed freely into the middle meatus. So far there has been no return of the swelling.

DISCUSSION.

Dr. D. R. PATERSON said he was not clear as to what had been done here. In von Eicken's[1] operation one had to get the lachrymal sac through the antrum. Probably Dr. McKenzie did West's operation. In this the speaker's difficulty had been to keep the opening patent, as in nearly all artifical openings there was a tendency to stenosis later. What had deterred him, however, latterly from proceeding with this operation in some cases was that he saw a case reported where the person had some difficulty in blowing the nose, for when he attempted it he blew air through the lachrymal sac and duct and he had to hold pressure on the corner of his eye to prevent it. In one case where there was a good deal of disease round the sac and in the ethmoid cells he had removed the sac; and in that and another case the result was excellent. Beyond a little watering when exposed to a cold wind, there was practically no discomfort resulting. A colleague had done Toti's operation of establishing a communication with the interior of the nose by stitching the mucous membrane of the sac to the nasal mucosa six times, three of which had been successful, but there also the difficulty was to keep the opening patent.

Dr. DAN MCKENZIE replied that he had shown the case in order that the operation might be tried more extensively. The results had been as Dr. Paterson stated: there were both successes and failures.

Brain, with large Pituitary Tumour, from Patient who died from Hæmorrhage after Partial Removal of Floor of Sella Turcica.

By W. HILL, M.D.

WOMAN, aged 32. Was sent by Dr. Leonard Williams to St. Mary's Hospital for the operation of decompression of pituitary region. She was of massive build and presented marked external signs of acromegaly in skull, face, limbs, &c. The skiagram showed great enlargement and flattening of the pituitary fossa with double outline. There was bitemporal hemianopsia. She suffered from drowsiness and marked mental hebetude. A large goitre was present.

A portion of the floor of the pituitary fossa was perforated with a mastoid hand burr of medium size after the sphenoidal sinuses had been opened (and their septum removed) through a tunnel made by submucous resection of the nasal septum; a Killian incision only was employed and made on the right side of the septum. On withdrawal of the burr after it had sunk into the fossa mainly through the roof of the larger right sphenoidal sinus there was a very free flow of venous blood, which was stopped by plugging with gauze dipped in adrenalin solution. On removing the plug a few minutes later the oozing was slight and soon almost stopped. A large fresh marine sponge was inserted in the nasopharynx, but the sphenoidal sinuses were not plugged, as it was decided after consultation with Dr. Williams and Mr. Graham that even continuous oozing was preferable to damming up blood in the cranial cavity and so increasing intracranial pressure. A severe hæmorrhage, unfortunately, occurred two hours later, and the loss was so great that the sphenoidal sinus was lightly plugged with gauze soaked in peroxide of hydrogen. As a good deal of hæmorrhage came on again later, and the pulse was bad, firmer plugging was resorted to and bleeding arrested, but the patient's condition became gradually worse with marked collapse and syncope, evidently the result of increased intracranial pressure, and she died eight hours after operation.

---

[1] Dr. McKenzie had misnamed the operation in the original notes.

Post-mortem: The convolutions on the vertex were flattened and the pituitary fossa was found to be of enormous size, filled with a soft, apparently malignant growth into which hæmorrhage had taken place; the tumour, after emerging from the large ring in the dura mater, expanded to the size of a Victoria plum and merged in the base of the brain; its thin capsule was bulged anteriorly and to the right by a large hæmatoma. There was no blood anywhere in the subdural or subarachnoid spaces, but there was an excess of cerebrospinal fluid. The unperforated part of the floor of the sella was bare and eroded, and showed no trace of dura mater. The right cavernous sinus was apparently intact, but the operation hole was close to it and possibly a rotten vein leading from it to the opposite sinus was opened by the burr, or the bleeding may have been from the tumour itself.

The case was, as it turned out, quite unsuitable for operative interference, and well illustrates the dilemma with which one is confronted when severe bleeding ensues in pituitary fossa operations.

[The diagrams and table of operative methods previously exhibited at the discussion on Pituitary Disease held at the combined meeting of the Sections of Neurology and Ophthalmology on March 5 and 12 (the report will be published in the next number of the *Proceedings*) were also shown].

DISCUSSION.

Dr. W. HILL added that in this case there was no protecting dura mater present, and that probably explained the tremendous hæmorrhage when the burr perforated the sellar floor. His view was that the purely endo-nasal Killian-Hirsch operation was not always the best. There was in the woman he was speaking of a condition specially favourable for that operation, however, in that she was an acromegalic and her anterior nares were very large, and there was no absolute necessity to resort to Mr. Graham's auxiliary incisions of either splitting the end of the nose or of slitting up one nostril. In an ordinary case, however, he would enlarge the anterior narial opening forwards and upwards, to get a wider proximal opening, as Mr. Graham had done in his second operation. If a general surgeon undertook a pituitary decompression it would be better for him to choose the Ollier or the v. Bruns operation of displacement of the external nose, because that would bring him an inch nearer to the floor of the pituitary fossa. For a rhinologist, however, there were no inherent difficulties connected with the Killian-Hirsch endo-nasal approach apart from hæmorrhage in acromegalic subjects. With increased experience one would probably come to look upon it as a fairly easy operation, but a large tunnel must be made so that one could touch the sellar protrusion with the finger. One must not resect too near the roof of the sphenoidal sinus, as there would be danger of wounding the optic chiasma—the real bugbear of these operations. The cavernous sinuses could be avoided by keeping to the middle line, but one must take one's chance as regards finding large intersinus veins, a very vascular malignant tumour, and absence of dura mater, a combination encountered in this instance and in several other recorded cases which had succumbed to hæmorrhage.

Mr. GRAHAM said he had been struck with the advantage of splitting the nose instead of working through the nostril. He advised the surgeon who contemplated the operation not to attempt it through the nostril unless he first split the vestibule. And that splitting should be started by the median incision. Another disadvantage of the Hirsch operation was that the columella was there the whole time, and that caused a deviation of the instrument from the middle line. His incision to the tip of the nose only could be enlarged upwards if necessary, and then one would be brought almost as close to the tumour as by any other method. He had used peroxide of hydrogen for a considerable time, but did not believe much in it. Pressure was, in his view, better; nothing for bleeding in the sella turcica excelled plugging with sterilized gauze straight on to the spot, as one would plug any bone cavity.

Mr. WAGGETT said the Section should feel indebted to Dr. Hill and Mr. Graham for bringing forward their cases, which served to illustrate the fact that whereas the operative technique formed an interesting and tempting branch of nasal surgery, the general subject of pituitary disease was still in its infancy. At the present time it was not even known how much of the gland could be removed without producing infantilism. It was to be hoped that at the International Congress in August the literature would be brought up to date.

Mr. PIKE said that five years ago in Vienna he saw Professor Eiselsberg do an operation on such a case in a woman; Professor Tandler, the Professor of Anatomy, devised the operation first on the cadaver, and was present at the operation, as also was the radiographer. The head of the patient was lying over the end of the table, in the surgeon's lap, and he operated through the nose.

Mr. O'MALLEY said that when in Vienna he had seen Hirsch do one of his cases, and there were certain features of the technique which struck him at the time as being somewhat extraordinary. The operation was performed in the out-patient department of the ear clinic at the Allgemeine Krankenhaus, under local anæsthesia, and the patient sitting upright on a stool. The septal route indicated by Dr. William Hill in the diagrams shown that day was the one adopted. It was done with biting forceps; he did not see a chisel used. Soft adenomatous material was taken away, and the patient was sent back to the ward. Three weeks later the patient seemed to be doing well. There was not more hæmorrhage than one saw in submucous resections.

Case of Pituitary Growth.

By C. I. GRAHAM, F.R.C.S.

S. P., AGED 43, is under the care of Dr. Wilfred Harris for failing eyesight of six years' duration, giddiness and frontal headaches, dull and heavy in appearance, but answers quickly and intelligently; amenorrhœa thirteen years; none of the usual external signs of acromegaly. She is unable to read, write, or sew, and can only distinguish faces of persons close to her. Her field of vision, left eye for white, has definitely contracted since 1907, while the right eye is blind, except for large white objects in upper nasal field. The left pupil reacts well to light thrown in any direction; the right pupil reacts badly to light. She has right optic atrophy and left optic neuritis. There is ptosis of both eyes. On February 2, 1913, 8 oz. of glucose were administered by mouth; 42 oz. of urine were collected in the succeeding twenty-four hours, which showed no trace of sugar, the specific gravity being 1020. Skiagram shows enlargement of sella turcica with apparent erosion of dorsum sellæ.

The exhibitor intends to perform a decompressive operation by the nasal route when the mouth is in a more healthy condition.

Specimen of Cerebral Tumour which involved Pituitary Fossa; Microscopical Section.

By C. I. Graham, F.R.C.S.

The case was shown at the meeting of the Section on January 10, 1913,[1] after operation on November 27, 1912. A second operation was performed on January 29, 1913, because of recurrence of marked drowsiness and headaches.

Because some difficulty in separating the muco-perichrondial flaps made by the previous operation was anticipated, it was decided to approach the pituitary fossa by way of the left nasal fossa proper; therefore the ventricle of the left vestibule was laid open by an incision $\frac{1}{2}$ in. in length, which began at the opening of the naris and terminated at the tip of the nose. Next the left middle turbinal was reduced in size, and after a few drops of blood were removed on wool pledgets, a vertical incision was made in the mucous membrane which had previously covered the front wall of the sphenoidal sinus. When the mucous membrane was separated laterally, some difficulty was experienced in distinguishing the dura from the adjacent bone; after defining the opening into the fossa by means of a probe, more bone was removed by means of a $\frac{5}{8}$-in. burr. Then the dura was removed by Luc's forceps and the fossa explored. A piece of growth was removed the size of half a walnut which appeared to be of a papillomatous nature. The patient bore the operation very well and next day was well enough to be moved to another ward in the hospital, but the same night, thirty hours after operation, suddenly collapsed.

Post-mortem: Cerebral convolutions flattened. An encapsulated growth the size of a small golf-ball was found in the position of the infundibulum in the floor of the third ventricle, distorting the optic tracts and raising the basal ganglia. There was a breach in the capsule of the growth where it lay over the pituitary fossa: the fossa contained a markedly compressed pituitary gland but no growth was found in the fossa. The entire floor of the fossa, which was very large, had been removed, the boundaries of the opening being the cavernous sinuses laterally, the olivary eminence anteriorly, and the dorsum sellæ posteriorly. There was no effusion of blood, nor was there any evidence of sepsis.

---

[1] See *Proceedings*, p. 61.

Provisional diagnosis of perithelioma by microscopic examination (Dr. Spilsbury).

Extensive Granuloma of the Larynx in a probable Case of Early Phthisis.

By T. JEFFERSON FAULDER, F.R.C.S.

MR. H. P., aged 21, was well until the spring 1912, when he had a "cold" and loss of voice; recovered more or less completely; again had a "cold" in December followed by loss of voice.

January, 1913: Voice reduced to a hoarse whisper; nasal cavities very wide; tongue furred and swollen; pharynx, larynx, and trachea intensely inflamed; in the inter-arytænoid space a tumour, like a papillomatous growth, preventing adduction of the cords; no dysphagia; no sputum or night sweats; no loss of weight or appetite.

February 2: Inflammation has subsided; voice still lost; cords cannot be adducted posteriorly. There are practically no physical signs in the chest, but the physician's opinion is that the case is one of very early phthisis.

Opinions are invited as to whether this is a case of tuberculous granuloma or simple papilloma of the larynx, and in either case as to what treatment should be adopted.

DISCUSSION.

Mr. JEFFERSON FAULDER added that Dr. Woodwark had seen the case three or four times, and gave it as his definite opinion that there was early phthisis at both apices, though the von Pirquet test gave no result.

Mr. BARWELL said the patient had an inter-arytænoid swelling, with some infiltration of the vocal cords, such as he had always associated with tuberculous laryngitis. The treatment depended on the patient's general condition of health, and the progress of his lung condition. The patient should be kept under careful observation for two or three weeks, and the temperature, weight, &c., carefully noted before the question of operation was entertained. If the general condition of the patient should be satisfactory, the outgrowth in the inter-arytænoid space could be removed.

A Cartilage of the Septum Nasi removed by Operation and showing a Circular Defect.

By T. JEFFERSON FAULDER, F.R.C.S.

THE mucous membrane on both sides of the septum was intact, but that on the wide side showed slight atrophy. The patient was a female, aged 23, a draper's assistant. The septum has healed satisfactorily.

DISCUSSION.

Mr. JEFFERSON FAULDER said that the case illustrated one of the difficulties in doing submucous resection. He did not know what was the explanation of the aperture in the cartilage. His instrument slipped through to the other side, after which he could see the perforation and avoid it. In a small way this case reminded him of one which he had reported, where a partial resection had been done previously with an incision too far back. He began his operation not knowing that part of the septum had been removed before, and everything went well until he arrived at the gap in the cartilage. It was possible to separate the flaps again after a period of five years.

Dr. DAN MCKENZIE said that two or three years ago he showed before the Section two specimens of a fenestrated cartilage removed by resection.[1] The genesis of those cases was very interesting. He believed the holes in the cartilage were due to deposits on both sides of the septal mucous membrane of mucus which, on drying, produced pressure atrophy of the underlying cartilage. He suggested that perforation of the septum was due to the presence of one of these fenestræ in the cartilage prior to the perforation of the membrane. He had been looking for many years for the typical classical case of acute perforating ulcer of the septum, but had not yet seen it. This pressure atrophy would not affect the bone, only the cartilage, since the former contained an intra-osseous blood supply, while the latter was nourished solely from its surface.

Dr. W. HILL said it was not uncommon in children to see a hæmatoma which had suppurated, and he had never incised such an one without finding a hole in the cartilage. A former suppurating hæmatoma was probably the explanation in some cases of a perforation of the cartilage but with intact mucosa.

---

[1] *Proceedings*, 1911, iv, p. 5.

A Post-mortem Specimen of Laryngeal Tuberculosis.

By E. D. Davis, F.R.C.S.

The specimen was obtained from a male patient, aged 38, admitted to Mount Vernon Hospital with advanced laryngeal tuberculosis, and with chronic pulmonary tuberculosis of the apex and pleura of the right lung. Death was caused by diffuse tuberculosis, with cavity formation of the right lung, and recent miliary tuberculosis of the left lung.

Patient was first seen in August, 1912, and a sketch of the condition of the larynx at that time is shown. He was treated by cautery puncture, rest, insufflation, &c., with little relief or benefit.

October: Epiglottis amputated with punch forceps (specimen shown). Patient was considerably relieved (?), wound healed within a week and did not cause any pain or dysphagia; ulceration of the base of the tongue and left ventricular band, and arytænoid curetted with Heryng's curettes both by the indirect method and by suspension laryngoscopy. The ulceration of the base of the tongue healed, and the ventricular band improved. At this point the patient appeared to be gaining ground, and tuberculin (B.E. $\frac{1}{50000}$ mgr.) injections were given with marked reaction, fresh sloughy ulceration, and definite retrogression of the patient. The patient suffered considerable pain, which was only slightly relieved by cautery puncture, curetting, and other remedies, but was almost completely abolished by the injection of eucaine and alcohol into the left internal laryngeal nerve and subsequently into the right nerve. After this injection, he gained 3½ lb. in one week, and improved rapidly.

At the end of January, when the larynx was doing well, an exacerbation of the lung condition occurred, from which he died on February 17.

The vigorous treatment of the larynx relieved the pain and discomfort, and prolonged life.

Wassermann reaction and sputum negative.

Amputation of the Epiglottis for Tuberculous Ulceration.

By E. D. Davis, F.R.C.S.

A male patient, E., with a long history of laryngeal and pulmonary tuberculosis. The epiglottic ulceration had been cauterized and curetted with no improvement. Amputation with punch forceps on February 5, 1913. Rapid healing of wound. Patient is receiving tuberculin B.E. 1 mgr.

DISCUSSION.

The President said he supposed all members had amputated the epiglottis, and probably with great relief when it was done for extreme pain on swallowing. But few were able to find out what happened to the cases afterwards, for they drifted away, and perhaps had a recurrence of symptoms. It was valuable to hear the later history of these cases, for they should make the operator careful in promising too much from the point of view of cure.

Mr. Barwell said he had amputated a number of epiglottides at the Mount Vernon Hospital, but they nearly all went to the bad eventually, because there was seldom extensive tuberculous involvement of the epiglottis until advanced tubercle was manifested elsewhere. It was only occasionally that one met with epiglottic disease in which the rest of the larynx was more or less healthy. He had had only two cases in which the larynx became completely healed after amputation of the epiglottis. One died eighteen months later of sudden hæmoptysis, but the larynx had remained well during that time. The other he operated upon in private twelve months ago, and the larynx had healed and remained well. The operation was usually performed simply for the relief of dysphagia, for which purpose it was very successful.

Mr. Edward Davis replied that he could confirm what Mr. Barwell said as to the prognosis.

Case of Laryngeal Infiltration for Diagnosis.

By Harold Barwell, F.R.C.S.

Chelsea pensioner, aged 80. Hoarseness and slight dysphagia for three months; a little dyspnœa during the last two weeks. Enlarged movable glands on the right side of the neck and a small aneurysm at the left carotid bifurcation. The infiltration affects the anterior parts of both ventricular bands and appears smooth, dusky, and somewhat œdematous. The right side is the more affected and its movements are more restricted than those of the left. The cords appear to be normal. The sputum shows no tubercle bacilli, but large numbers of what appear to be pneumococci.

The PRESIDENT asked whether members could throw any light on the diagnosis. One vocal cord was moving very freely, and there was no definite sign of ulceration. He thought chronic tubercle was more likely than malignancy.

Suppurating Mucocele of Frontal Sinus in a Boy, aged 12.

By HAROLD BARWELL, F.R.C.S.

NOTE on February 21: Severe "cold" two months ago, with profuse discharge from the left nostril. Swelling on forehead noticed for one month; eight days ago great swelling of eyelids, subsiding under hot fomentations. No pain. Hard, bony swelling over site of anterior wall of left frontal sinus, and in upper, inner angle of left orbit. Streak of pus high up in left hiatus semilunaris, reappearing rapidly after mopping; no pus after stooping.

DISCUSSION.

Dr. DAN MCKENZIE said he did not believe that mucocele of the frontal sinus meant that the duct of the sinus was blocked and mucus accumulated in it. He considered the condition to be due to the formation of a mucous cyst inside the sinus.

The PRESIDENT agreed with Dr. McKenzie's view as to the nature of some of the mucoceles. With regard to the size of the frontal sinus in children, he remembered a boy, aged 8, whom he saw with acute frontal sinus suppuration complicating scarlet fever. That boy had a sinus as large as a horse-bean.

Mr. EDWARD DAVIS said he made a post-mortem examination of a child aged 4, who died of orbital cellulitis following scarlet fever, and the question was whether the frontal sinus was responsible. The frontal and sphenoidal sinuses were occupied by vascular cancellous bone, but there were no cavities. The antra were well developed, but without ostia, and the ethmoidal cells were very small.

Dr. BRONNER said he had seen two cases of frontal sinus disease after scarlet fever, and those children had large sinuses. He asked whether members had tried injections of tincture of iodine in frontal sinus disease. He had done so in two cases, and the discharge stopped after three injections.

Mr. BARWELL, in reply, said he agreed that the mucocele was a dilatation cyst of a mucous gland in the lining. In this case he could see a stream of pus coming into the nose; evidently the ostium was not blocked. He had had to operate on the boy since sending the notes of the case: the bone was considerably expanded and thin, and the sinus extended 1 in. above the orbital margin. He could not have done a Killian operation if he had wanted to, as the bone was too soft; he had performed the Ogston-Luc operation with immediate closure of the wound, and the case had done very well.

Congenital Tumour of the Septum, probably Glioma.

By FRANK ROSE, F.R.C.S.

F. D., AGED 10 months. Nasal obstruction was noticed at birth. The mother detected a swelling in the left nasal cavity at the age of 2 months. At the age of 4 months a pale, smooth swelling filled the left nasal cavity. It had a broad attachment to the septum, but none to the floor and outer wall. Its upper limit could not be determined. The swelling caused slight protrusion of the external nose. A piece was removed for examination and is believed to show the structure of a glioma.

Congenital tumours arising from the septum are rare. Two cases have been recorded, both of which were described as gliomata.

Mr. ROSE said he did not propose to do any more at present. He had removed a piece for microscopical examination. The only similar cases of which he had found records were those of J. P. Clark, in the *American Journal of Medical Science*. They were both males, and had the tumour on the left side, and attached to the septum; there was in them also some distension of the nostril. There was no evidence in either case that the tumour was malignant. The question was whether it was glioma: the microscopical appearances were difficult. He had submitted the specimen to Professor Andrewes and Mr. Shattock, and they agreed that, as far as one could tell by the microscope, it was a glioma.

Sarcoma of the Left Tonsil.

By Norman H. Pike, B.S.

The specimen was removed by me from Mrs. I., aged 26. Her history was that she had had an "ulcerated" throat over two years ago. For the past year she had noticed, when looking in the glass, that there was a lump on the left side of her throat. She frequently had sore throats and a more or less constant pain shooting up in front of the left ear. She had some stiffness on the left side of the neck and attacks of deafness in the left ear.

I first saw her at the Cheltenham General Hospital on January 23, 1913. Examination showed the left anterior pillar of the fauces to be pushed forward, presenting a rounded and swollen border; there was some extension of the swelling upwards. Palpation showed the whole mass to be of a cartilaginous hardness. Only a small portion of the tonsil was visible between the pillars of the fauces. Two small upper cervical glands were palpable. She heard the acoumeter at 5 metres with the left ear.

On February 3 a general anæsthetic was given. After a preliminary laryngotomy the left tonsil was removed by dissection, through the mouth, together with a portion of the anterior pillar. The tonsil shelled out easily, and there was little hæmorrhage. Care was taken to remove the lingual prolongation from the base of the tongue. The right tonsil was also removed. The pathologist, Dr. Hebblethwaite, reports a spindle-celled sarcoma limited by the capsule. The right tonsil was normal. The microscopical sections are also exhibited.

On February 20 two small cervical glands were removed, one about as big as a hazel-nut, the other the size of a pea.

DISCUSSION.

Mr. Pike added that it looked as if there was a local recurrence already, but it was only five weeks since removal. Was the prognosis of these cases always bad? The glands removed were examined microscopically and were free from sarcomatous cells.

Dr. Dan McKenzie said the prognosis of the condition was bad. Last winter he saw a case in which the course was only six weeks.

The President agreed as to the gravity of the prognosis. He had not seen a case recover in which the diagnosis was beyond doubt, although the tumour was easy to remove by a kind of enucleation.

Tumour in the Left Maxillary Antrum.

By John F. O'Malley, F.R.C.S.

F. L., aged 54. This patient complains of obstruction in the left side of the nose for four months, pain referred to the teeth, and swelling of the face on the same side. The pain and swelling are getting worse lately. On examination one finds the left nasal cavity blocked by a greatly enlarged anterior end of the inferior turbinate, on the size of which cocaine and adrenalin have practically no effect. On the aspect of the turbinate, which is in contact with the septum, the mucous membrane is ragged, and on attempting to pass a probe the bleeding is very free. About the centre of the orbital boundary of the antrum a hard mass can be felt, which, when pressed on, causes the patient to wince and complain of pain in the left upper teeth. There is no disturbance of vision. Transillumination shows a good crescent on the right side and none on the left. Potassium iodide has been given for three weeks without any result.

Case of (?) Lupus of the Nose.

By John F. O'Malley, F.R.C.S.

H. H., female, aged 41, has had bilateral nasal discharge for three months, said to come on after an attack of "rheumatic fever." The history of the illness is not quite typical of acute rheumatism—i.e., swelling of both forearms from fingers to elbows, with blistering of the skin followed by scaling. No other joints were swollen. The mucous membrane on the septum, floor, and inferior turbinates of both sides looks uneven and sodden and covered in parts with moist muco-pus; there is some muco-pus in the upper nasopharynx, but no alteration in the mucons membrane, except around the orifice of the right Eustachian tube, where it is a little swollen. Portion of what appeared to be a granulation-like projection on the left inferior turbinate was sent for pathological report. This is not conclusive, but states "that the appearances are suggestive of lupus." Transillumination of the antra and frontal sinuses is clear.

DISCUSSION.

The PRESIDENT said he thought the appearances suggested sinus suppuration: he could not see any definite granulations in the nose. He had not seen lupus with such a free discharge of pus.

Dr. KELSON said he regarded it as a chronic septic condition, and he suggested that cultures should be made from it.

Mr. LAYTON suggested that the condition was due to very septic tooth stumps. He had seen recently several cases sent by dental surgeons in which there was a septic discharge from the nose, which had cleared up with removal of the septic stumps.

Mr. O'MALLEY replied that the sinuses were clear. There was a part which looked like a granulation mass, and he took it away. It was sectioned in Mr. Foulerton's laboratory and the report suggested lupus. The Wassermann reaction was negative. He used cocaine and adrenalin, but it did not give the pale look of the mucous membrane with the raised pinkish spots which one associated with lupus.

Case of Congenital Syphilis with Intranasal Lesions.

By JAMES DONELAN, M.B.

GIRL, aged 16. The stress of the tertiary ulceration fell on the left middle turbinal and septum. There is no perforation, but there was an abscess affecting the anterior border of the septum, which resulted in the present retraction. She has now been treated with mercury and iodides—at first by inunctions, and latterly chiefly with Donovan's solution, for nearly three years. She is so much better that it is thought some operative treatment to improve nasal respiration might be undertaken, as well as, possibly, an attempt to improve the external shape of the nose by means of paraffin. Salvarsan has not been employed in this case.

DISCUSSION.

Mr. JEFFERSON FAULDER thought the appearance of the nose might be improved. Before interfering he would have a Wassermann test done. With regard to the suggestion to use paraffin, he asked whether members had experience in elevating such depressions by means of a freshly removed piece of cartilage from another case, or from the same patient. He had done that operation. First, a small incision was made with a tenotomy knife over the nasal bones, then with an elevator a bed was made under the skin for the cartilage, which was then placed in position, and the small incision over the nasal bone sutured. The immediate result was very good. He would show one or two of the cases.

The PRESIDENT thought the only cases suitable for paraffin were those in which there was a hard bony bed or support on which the injected paraffin could rest. He had never injected paraffin, but he had dissected it out in cases where it had wandered among the neighbouring tissues.

Case of Post-diphtheritic Adhesions of Soft Palate.

By JAMES DONELAN, M.B.

GIRL, aged 17. The patient suffered from severe diphtheria when aged 4. It will be noticed that there are post-diphtheritic cicatrices about the mouth. She had also double diphtheritic otitis. When aged 6 an operation was performed at the London Throat Hospital, Golden Square, for the relief of the palatal adhesions, and the palate was tied forward by means of ligatures passed through the nostrils for some two weeks, but the adhesions re-formed. At the age of 12 a double mastoid was performed at the Royal Ear Hospital by Mr. Bowen with successful result. The case is now shown with a view to elicit opinions as to the nature of the operation, if any, that should be performed to re-establish nasal respiration.

DISCUSSION.

The PRESIDENT said Dr. Donelan had been obliged to leave but had left a note stating that the patient was one of a large, healthy family, some older and some younger than the patient. The marks about the mouth were said to have been caused at the time of the diphtheria. These lesions were not now so common as they used to be before antitoxin was so freely used. The President asked whether the adhesion of the palate to the posterior pharyngeal wall, and the scars on the lip were the result of diphtheria, or due to syphilis. He had not seen definite ulceration in the palate even in the worst kind of pure diphtheria.

Dr. BROWN KELLY said the only treatment of use in this case was a broad hook attached to the denture, and worn for months.

Microscopical Section of Pedunculated Growth of Nose.[1]

By W. H. Kelson, M.D.

Man, aged 72. The section shows much dilated vessels in a connective tissue stroma. There is no history of epistaxis whatever. Do so-called "bleeding polypi" always bleed?

Dr. Kelson said that Dr. Pegler wished him to say that he now agreed that it was a "bleeding polypus," but he considered that the situation of this one had probably protected it somewhat from trauma and that, therefore, it did not bleed.

Cyst of the Tonsil.

By T. B. Layton, M.S.

In the region of the upper part of the left tonsil there projects from under the anterior pillar of the fauces a small cyst having a diameter of $\frac{3}{4}$ in. The patient is a girl, aged 12, who came under observation for a sore throat, without any symptoms definitely due to the cyst.

A Man, aged 27, with Paralysis of the Right Vocal Cord and of the Right Half of the Palate (the Facial, Auditory, Glosso-pharyngeal, and Accessory Portion of the Vagus involved).

By J. Dundas Grant, M.D.

The patient was sent to the exhibitor on account of facial paralysis of seven days' duration; this was preceded by pain in the right ear for seven days and discharge from that ear which has now lasted for a month. He had gradual dullness of hearing for six months, and for the last two days his voice has been weak and he experiences a feeling of weakness in deglutition. There is absolute immobility of the right vocal cord close to the middle line; the palate is drawn to the left during phonation; to the laryngeal probe the sensation on the right side of the larynx is less marked than on the left. Taste is complete on the anterior part of both sides of the tongue and on the posterior pillar of the fauces and corresponding part of the tongue on the left side, but it is completely absent on the posterior part of the right side of the tongue and on the right pillar of the fauces. The optic disks, pupils, and extra-ocular muscles are normal. The masseters and tongue are normal in their movements. There is no cutaneous anæsthesia or analgesia. No weakness or ataxia of the limbs; the reflexes are normal.

---

[1] Shown at the last meeting, see *Proceedings*, p. 77.

The hearing tests are as follows:—

	Right ear	Left ear
For conversation	Contact (with "noise-machine" in left ear)	—
For whisper	CO	20 feet
Galton	5	2
Bone-conduction	Almost *nil*	−½ sec.
Vertex	<	<
Rinne	negative (reversed)	+

There is no vertigo, and, on rotation, normal nystagmus was elicited on both sides. The nerves involved are, therefore, the facial, the auditory, the glosso-pharyngeal, and the accessory portion of the vagus on the right side. There is a bulging of the walls of the right auditory meatus, and in the interior can be detected some papillated granulation-outgrowth, and bare, rough bone is perceptible to the probe in the depths of the meatus and various parts of the walls, but the pain on probing was so great as to prevent it being carried out with any exactness. No specific history was obtainable, and no evidences of previous specific infection. The combination of signs indicates disease of the inner apex of the petrous bone, and in view of the fact that there is some flattening at the apex of the right lung where there has probably at a previous time been an active focus of tubercle, the likelihood is that in this case there is tubercular disease of the bone. A portion of the granulating outgrowth will be removed for microscopical examination, with a special view to the elimination of malignant disease. The Wassermann reaction will also be tested.

Hæmorrhage into the Right Vocal Cord, the Result of an Accident at Football.

By W. M. Mollison, M.C.

Mr. H. W. E., a student at Guy's Hospital, while playing football a week previously received a kick in the neck on the thyroid cartilage, a little to the right of the middle line. He experienced a feeling of shock and of suffocation; this passed off, and he found his voice was very weak; he had, too, considerable pain on swallowing, and had a constant desire to swallow.

Seen within an hour of the accident he could scarcely speak, and an examination of the larynx showed slight swelling of the right vocal cord. On attempted phonation the cords approximated but the arytænoids were not symmetrical, the right getting a little in front of the left (this is no doubt a normal abnormality in this case). Two days after the accident the voice was still weak, but normal in character, and the patient felt well, though on walking he again experienced a feeling of suffocation, but in much less degree than before. The larynx then and now showed hæmorrhage into the right cord, while the left was normal.

Laryngological Section.

April 4, 1913.

Mr. HERBERT TILLEY, President of the Section, in the Chair.

Announcement.

THE PRESIDENT (Mr. Herbert Tilley) said that one of the matters which had just been discussed at the meeting of the Council of the Section might with advantage be made known at once, so that its purport might reach the various laryngological clinics. Many members of the Section thought that some of the junior practitioners of laryngology experienced a just grievance or a difficulty in that, although they wished to become members of the Section, they were precluded by the rule which enacted that their claim could only be established on the grounds of (*a*) professional eminence; (*b*) recognition by the Council of one or more publications in the literature of laryngology; or (*c*) having charge of a clinic recognized by the Council. A man, at the beginning of his laryngological career, might find it very difficult to establish his claim on any of these three bases. The Council had to-day decided to propose at the Annual Meeting in May that a duly qualified practitioner who had been a clinical assistant for not less than twelve months in a clinic recognized by the Council should be eligible as a member of the Section. This suggestion would be submitted to the Annual Meeting, but as that would not occur for some time he thought it desirable to ventilate the matter at this meeting.

Steel Shawl-pin removed from one of the Hyparterial Branches of the Right Bronchus, where it had been Lodged for Ten Days.

By HERBERT TILLEY, F.R.C.S.

B. W., AGED 42, was admitted to University College Hospital on March 18, 1913.

History: Ten days previously, while holding the pin in her mouth, she coughed and "felt the pin go down." Fits of coughing lasting for fifteen minutes followed. Two days later she felt intermittent pain in right side of chest near the mid-sternal line. On the sixth day more coughing, but none since.

March 17; Patient was "screened" by Mr. Worrall and the pin was located in the right bronchus with the point upwards; the pin was on a level with the neck of the eighth rib.

March 18: Patient was given a hypodermic of morphia and atropine at 5.30 p.m. and at 6 o'clock chloroform was administered by Mr. Beresford Kingsford, and when narcosis was established the larynx and trachea were painted with a 20 per cent. solution of cocaine, and the right bronchus entered by the direct method (Brünings's bronchoscope). Considerable difficulty was experienced in seeing the pin because the point was directed towards the observer, and when it was located it looked like a thin thread of mucus. Twice it slipped from the grasp of the forceps, but at the third attempt it was slowly withdrawn with the bronchoscope.

The operation lasted six minutes and the patient left the hospital next day none the worse for her experiences previous to or during her short stay in the hospital.

The PRESIDENT said he brought forward the case because of the difficulty of seeing the foreign body, and he wished to elicit whether other members had found similar difficulties in like cases. A pin, when inhaled into a bronchus, was apt to go down head-first, hence on looking down at it one's line of vision was parallel to the shaft of the pin, and it was difficult to see anything at all. Had it not been for the X-rays, the pin might have been missed entirely. Furthermore, the case showed that a patient might harbour a foreign body in the lung without any untoward symptom. On the other hand, four years ago he was asked by Sir Thomas Barlow and Sir Rickman Godlee to see a patient in the hospital who, it was thought, had inhaled a foreign body. She had a slight evening temperature, a hacking cough, and there were fine râles in the upper part of the left lung, so that the case might easily have been regarded as one of early tubercle, had not the X-rays demonstrated another reason for the symptoms.

An Instrument for Expediting the Examination of Embedded Tonsils.

By HERBERT TILLEY, F.R.C.S.

THE instrument is shaped like an ordinary Fraenkel's tongue depressor, but the distal end is replaced by a small concave bar placed at right angles to the shaft. If the outer portion of the tonsil is pressed on, the gland tends to face the observer, and often septic accumulation may be expressed which otherwise might pass unnoticed. Made by Mayer and Meltzer.

DISCUSSION.

The PRESIDENT apologized for showing yet another instrument for dealing with embedded tonsils. It was very useful in obtaining a more complete view of those inconspicuous tonsils which often concealed septic accumulations—a fertile cause of obscure pyrexias in young children and of recurrent attacks of tonsillitis in adults.

Dr. DONELAN regarded the instrument as a valuable one, not only for examination, but for treatment, as in follicular tonsillitis, if one wanted to cauterize or otherwise destroy the crypts. It differed materially from the late Mr. Baber's instrument.

Cast of the Epithelial Lining of the Œsophagus, from a Case of $CHCl_3$ Poisoning.

By G. N. BIGGS, B.S.

THE patient drank about 1 oz. of chloroform, which was at once vomited. For two days she complained of pain in the throat, and difficulty and pain on swallowing. There was no dyspnœa. On the third day she vomited the cast; there was no hæmorrhage. The patient was given 1-dr. doses of bismuth carb. 30 gr., lanoline 1 dr., and paroleine 1 oz., every four hours, and fed rectally for fourteen days. After remaining in hospital for six weeks the patient was examined by direct œsophagoscopy, when the surface of the œsophagus was found to be completely healed over and there was no tendency to stricture at any point.

The patient has recently been examined by direct œsophagoscopy—i.e., three months after taking the drug—and the œsophagus shows no tendency to contract at any point.

Case of Sarcoma of the Right Tonsil.

By G. N. Biggs, B.S., and William Turner, M.S.

Female, aged 13. The patient came to the Out-patient Department of the Seamen's Hospital, Greenwich, on January 2, 1913, complaining of a sore throat and difficulty in swallowing.

History: Three weeks ago she noticed a lump on the right side of the neck, just below the angle of the jaw. It was not tender or painful. Shortly afterwards she experienced a pricking sensation on the right side of the throat, and her breath began to smell very foul. During the last week she had noticed that a swelling had appeared in the region of the right tonsil. She had become thin during the last three weeks although her appetite had been good.

Previous history: Patient has been a healthy child; no illness save scarlet fever and measles. No history of recurrent sore throat and no difficulty of breathing through nose or snoring at night.

Family history: No history of syphilis. Seven other children all alive and well; two died in infancy of lung trouble. Mother had no miscarriages. Father well and strong. No history of sarcoma on either side as far as could be ascertained.

Condition: When seen in the Out-patient Department on January 2, 1913, the patient was a rather delicate girl, but she did not look ill. The right tonsil was enlarged to the size of a large plum, projecting into the pharynx and pushing the soft palate forwards. The swelling was of a dark maroon colour, soft and fleshy in consistency, and was not tender to touch. The mouth was very foul, but at that time no necrosis of the growth was present. There was an enlarged lymphatic gland just behind the angle of the jaw, painless and very hard on palpation. When she came on January 6, 1913, the condition had advanced with extraordinary rapidity; the child looked pale and anæmic, and was very ill. Temperature, 101° F.; pulse, 120. Her breath was exceedingly foul, with a gangrenous odour. On examining the mouth it was seen that the whole of the tonsil had become gangrenous, and that this process had extended on to the right margin of the soft palate. The gland in the neck had markedly enlarged, and two or three other deep cervical glands in the region had appeared. These glands had now become tender. The child was admitted into hospital and given H_2O_2 spray, formalin mouth wash, alternately every hour, but the gangrenous process continued to spread. Blood count: White blood corpuscles, 7,600; red blood corpuscles, 1,260,000; polymorphonuclears, 55 per cent.; lymphocytes, 45 per cent. Anæmia of secondary nature, with high mononuclears and low polymorphonuclears. Wassermann's reaction negative. Urine: Specific gravity, 1024; acid; no blood, albumin, or sugar.

Course: The growth rapidly extended in all directions.

Inwards: Three days after admission it had affected the right half of the soft palate, including the uvula. The picture presented at this stage was interesting. At the line of extension there was a swollen and deeply injected line of about 3 mm. width, running across the palate from the anterior right-hand corner to the posterior margin to the left of the uvula. The palate behind this line was simply a mass of foul gangrenous slough, pieces of which could be easily picked away. Thus the gangrenous process apparently followed immediately upon the extension of the growth. A week after admission the whole of the soft palate was involved, and on January 16 it had spread to the left tonsil, the whole of which became gangrenous. The odour at this time was horrible, and no deodorants had the slightest effect upon it.

Backwards: The posterior pharyngeal wall became involved and gangrenous towards the termination of the case.

Downwards: The lateral pharyngeal wall below the tonsil also became gangrenous nine days after admission.

The glands in the neck rapidly enlarged, so that at the end of the week there was a nodular mass behind and below the angle of the jaw on both sides. The skin became stretched and shiny, and later on the glands became softer and very tender, but they did not break down.

Swallowing rapidly became difficult, and later almost impossible, and very little nourishment could be taken.

The patient became weaker, and the toxæmia increased in intensity. The temperature rapidly rose, and the pulse-rate increased to 140 and 150 at the ninth and tenth day. She became emaciated, and towards the end was almost comatose. There were no physical signs of septic broncho-pneumonia. There was no stridor or dyspnœa.

Bleeding: Although the gangrenous process was so intense no serious bleeding occurred. On January 16 ligation of the common carotid was contemplated, but owing to the serious condition of the patient this was thought to be out of the question.

Death: On January 18 she died from acute toxæmia, without any other symptoms appearing.

POST-MORTEM NOTES (JANUARY 20, 1913).

Oral cavity: The pharyngeal space was found to be occupied by the enlarged tonsils which practically met in the middle line, and had a black, gangrenous appearance. Soft palate was involved and the uvula had disappeared.

Neck: All the glands in the neck on both sides of the trachea were much enlarged, discrete, soft, and not adherent to each other or to the adjacent structures. On section, they were uniformly white in colour, fleshy in consistency, and showed no signs of caseation or suppuration; the glands in the upper portion of mediastinum were also enlarged.

Lungs: Emphysema of upper lobes of both lungs. On the pleural surface of lower lobe of right lung two small upraised swellings the size of a split pea were present; ? secondary deposits.

Bases: Congested and œdematous.

Heart: Subpericardial petechiæ. Cloudy swelling.

Liver: Enlarged. Cloudy swelling and early fatty degeneration.

Kidneys: Enlarged, with faint yellow streak through cortex. Cloudy swelling.

All other viscera normal.

On section, microscopic: Gland of neck shows round-celled sarcoma with very little interstitial tissue lympho-sarcoma.

The PRESIDENT (Mr. Herbert Tilley) considered that the history of the case was almost unique in the rapidity of the ulceration. It would be interesting to know what bacteriological examination had been made.[1]

Cyst of Arytæno-epiglottidean Fold which has Burst Spontaneously.

By E. A. PETERS, M.D.

M. C., AGED 63, complained of slight choking sensation and loss of voice for a month. A red, tense swelling occupied the fold projecting beyond the middle line; the arytænoid was forced into a position of phonation. The voice was hoarse and passed into a whisper. Seven weeks from the commencement of the symptoms the cyst appeared paler and more prominent. At eight weeks the voice suddenly returned, and the cyst will be seen to have collapsed and to exude mucus from a rupture on the upper surface.

---

[1] A bacteriological examination was carried out and revealed the presence of streptococci and staphylococci in large numbers in the throat.—G. N. B.

DISCUSSION.

Dr. PETERS said the point of interest to him was that the cyst had refilled. Some of these, if punctured, disappeared permanently; but that was not the case here. The patient complained of a little tenderness, but there had been no other evidence of inflammation. When the cyst burst, it was possible to see mucus escape from the rent surface. He would either pinch out a small piece of the surface, or apply the cautery, and make a larger opening.

The PRESIDENT asked the experiences of members as to these cysts filling up again after galvano-puncture. He had not been fortunate in this respect with a recent case in which he had used the method. To cure them he found it necessary to make a fairly thorough removal of the cyst wall. The previous day he had seen a patient who he thought risked sudden asphyxia, for an enormous cyst was filling the entry into the larynx and seemed to grow from the left arytæno-epiglottidean region. He cocained its surface, and then punctured the wall with the galvano-cautery, and removed the cyst wall as far as possible with forceps, used by the direct method. Finally he applied the galvano-cautery to the inside of the cyst walls. This was done some three weeks ago, but yesterday the patient returned with what appeared to be a recurrence of the lower part of the cyst and a thickening (? perichondritis), of the left half of the epiglottis and aryepiglottidean fold.

Dr. FITZGERALD POWELL said that for such cases he had been in the habit of using the galvano-cautery to destroy the wall of the cyst, and applying it fairly freely to the inside of the cyst, with the object of setting up adhesive inflammation. In this way he had obtained cures, and had not seen any recurrence of the cysts. Merely pinching out a portion of the cyst wall would not destroy the cyst, which was liable to refill unless adhesive inflammation took place.

Mr. WAGGETT thought the ideal method for dealing with these cases would be the suspensory method, using one hand to fix the cyst wall, and the other to cut it off cleanly with the cautery.

Mr. BADGEROW said he had used the galvano-cautery in three cases, and there had been no return of the cyst.

Cyst on Epiglottis, with Symptoms suggestive of Œsophageal Stricture.

By JAMES DONELAN, M.B.

PATIENT, a man, aged 59, was sent from the French Hospital to the Italian Hospital three weeks ago. He had been treated in the former hospital for gastritis. Six weeks ago he began to find difficulty in swallowing solids and about three weeks later liquids. He can, however, at times swallow solids without much difficulty, and seldom has trouble with liquids. The difficulty takes the form of a sudden closure of the gullet, with rejection of the food, followed by a copious flow of mucus. No tumour or other abnormality could be detected by Röntgen-ray examination. A test meal containing bismuth was observed to pass without difficulty. The case appears to be one of spasm of the gullet, but how far the cyst on the epiglottis may act as an exciting cause remains to be determined.

DISCUSSION.

The PRESIDENT said he believed Dr. Jobson Horne had shown a case of a cyst of the epiglottis in which pain and difficulty of swallowing were complained of. Many weird symptoms were attributed to it, yet the cyst was only a small one. He asked whether Dr. Donelan proposed to operate on this case.

Dr. FITZGERALD POWELL said it seemed extraordinary that a small cyst in the epiglottis should cause so much trouble. There was difficulty in seeing the patient's arytænoids. The posterior wall of the pharynx seemed to bulge forward, and he wondered whether there might be a neoplasm in the pharynx.

Dr. DONELAN replied that he proposed to make an endoscopic examination as suggested by Dr. Hill. The patient was able to swallow good meals of meat, fish, and potatoes occasionally, and the screen examination revealed no abnormality.

Case of Post-diphtheritic Adhesions of the Soft Palate.

By JAMES DONELAN, M.B.

THE patient, a girl, aged 17, was shown at the last meeting.[1] It was suggested that the cicatrices about the mouth might be due to syphilis. The exhibitor, though he had no reason to agree with this view, has tried a mixed course of mercury and iodides during the last four weeks without the smallest resulting alteration in the appearances, save a little herpetic eruption on the lip. He still accepts the mother's account that they were caused by the formation of diphtheritic ulcers on the skin about the mouth. Members whose experience goes back to fifteen or twenty years ago will doubtless remember that this kind of disfigurement was more common than since the introduction of antitoxin.

---

[1] See *Proceedings*, p. 117.

DISCUSSION.

The **PRESIDENT** reminded the meeting that the question raised when the case was previously shown was as to whether diphtheria pure and simple could cause these ulcerative lesions, or whether they were caused by a consentaneous scarlet fever, or, on the other hand, were they of syphilitic origin or even due to some other microbic infection ?

Dr. **WYLIE** considered that the case still looked like a syphilitic one ; and that if "606" were given a difference would soon be manifest.

Dr. **FITZGERALD POWELL** said that even if syphilis were the cause, anti-syphilitic treatment would have no effect on the resulting scar tissue. The Wassermann test would be the best guide. The question of the extensive ulceration and formation of scar tissue, said to be produced by scarlatina, was discussed at this Society some years ago when similar cases were shown, and the general opinion was that in these days of antiseptics, this severe ulceration and scarring did not take place in scarlatina, but that nearly all cases were due to syphilis.

Dr. **KISCH** said he had charge of this girl for a short time at the Royal Ear Hospital, and went carefully into the history ; there was no suggestion of syphilis in the case. At that time he gave her a course of mercury and iodide, not with the idea of altering the local appearances, but to see what effect on the general condition would be. He was not convinced that it was diphtheria, which of itself very rarely caused ulceration, but suggested that the condition was due to a streptococcal infection.

Dr. **DAN MCKENZIE** thought that the throat appearance was that of syphilitic adhesions. If the Wassermann test proved negative, he supposed one could say the adhesions might have been due to diphtheria, though he had never seen such a degree of scarring from diphtheria.

Dr. **PETERS** suggested that in this case there might have been a mixed infection—scarlet fever and diphtheria. The latter disease by itself rarely, if ever, caused ulceration.

Dr. **WATSON-WILLIAMS** suggested that the title of the case should be so stated as to suggest that it might not be diphtheritic. There was only the mother's statement that it was diphtheria.

Dr. **DONELAN** replied that there was no reason whatever to suspect syphilis. As already detailed at the last meeting, the father and mother were healthy, and so were all the other children. Of course, he could not say that the case might not have been one of mixed scarlet fever and diphtheria. The disease occurred and the cicatrices about the mouth were formed thirteen years ago when the child was only aged 4. The diagnosis on the charts and books of the Hampstead Hospital appeared as diphtheria. Though it was nowadays rare, he did not agree that severe uncomplicated diphtheria was incapable of causing scarring about the mouth from acrid nasal and buccal discharges, with resulting ulceration. He had himself seen several such cases in the practice of the late Sir Morell Mackenzie and one in which a diphtheritic patch had formed over the sternum with a resulting cicatrix. If a Wassermann test had a negative result it would not prove that there had been no syphilis; though, of course, a positive one, which he had no reason to expect in this case, would be of value. However, if it could be arranged, he would have a Wassermann test done.

An Unusual Case of Laryngeal Tuberculosis.

By E. D. Davis, F.R.C.S.

A well-developed, healthy-looking young man with destruction of the upper portion of the epiglottis. When first seen the granulation tissue of the epiglottis obscured the view of the larynx. After several unsuccessful attempts to remove the diseased portion of the epiglottis with punch forceps, the patient was anæsthetized and Killian's suspension laryngoscopy apparatus was used and the epiglottis "trimmed." With the exception of the right ventricular band and cord the lesion appears to be confined to the epiglottis. Sputum: Tubercle bacilli present. Wassermann reaction negative. Chest: Obscure physical signs.

A sketch of the condition before operation and a microscopical preparation of tissue removed were shown.

Mr. E. D. Davis added that he was unable to remove the granulation tissue of the epiglottis, as it slipped out of the grasp of the forceps and dropped back into the larynx. He therefore cocained the epiglottis and with a general anæsthetic used Killian's suspension laryngoscopy apparatus; he did not think he could have completed the operation but for this instrument, which enabled one to use both hands. Other attempts to remove the granulation tissue with various forceps had failed.

Tumour and Microscopic Section from a Case of Papilloma of Soft Palate.

By Walter Howarth, F.R.C.S.

The case was shown at the last meeting.[1] At the operation it was found that the tumour infiltrated the palate and extended deeply into the lateral wall of the pharynx on the left side. Bleeding was very troublesome, but a laryngotomy was avoided by the use of Kuhn's peroral intubation apparatus. The section shows a round-celled sarcoma.

[1] See *Proceedings*, p. 99.

DISCUSSION.

Mr. HOWARTH said he thought it was extraordinary for the patient, aged only 7, to have had a papilloma last July, a pure fibroma in December, and a round-celled sarcoma in March. In answer to the President, he said there were no enlarged glands in the neck, but he removed soft palate and tonsil, and as much of the tumour as extended into the lateral pharyngeal wall. He had to leave a raw surface, but it granulated up, and so far there was no sign of recurrence. When he showed Kuhn's apparatus three months ago, none of the members seemed to have used it. He had found it satisfactory, and no blood entered the larynx. At St. Thomas's Hospital some of his colleagues used the apparatus for extensive operations on the tongue, and found it very satisfactory. There was considerable bleeding in this case, but it was controlled by forceps in the usual way.

Dr. DAN MCKENZIE said he had hoped a pathologist would have said something about the natural history of this tumour as it changed its nature so much. Though tumours did not "breed true," the history in this case was surely a remarkable one. He would like to know whether there was a tendency to œdema after the use of the per-oral intubation in childhood. [Mr. HOWARTH : No.]

Case of Old Specific Laryngitis.

By F. F. MUECKE, F.R.C.S.

(For HUNTER TOD, F.R.C.S.)

URGENT tracheotomy done five years ago. Patient returned to the hospital for the first time this morning (April 4) with increased difficulty in breathing. Small warty growth in the trachea at the end of the tracheotomy tube.

DISCUSSION.

Mr. MUECKE asked whether anything should be done to remove the warty growth, which was quite hard.

The PRESIDENT suggested that if the exhibitor were to look lower down he might find that the trachea had been pressed upon by an aneurysm or mediastinal growth. It was a good case for the direct method.

Dr. PETERS said he closed the cervical opening and the patient could breathe through the larynx, but appeared to have bronchitis, or to have had it.

Dr. DUNDAS GRANT said he had reported a case to the Section in which, after performing tracheotomy for papillomata of the larynx, he found the patient was still unable to breathe until, by a great effort on the patient's part, a portion of soft papilloma was coughed up through the tracheotomy wound. Dr. Grant found it to be a sessile growth on the wall of the trachea, and he pulled away the remainder of it. That was the only occasion on which he had found anything similar to this case.

Mr. MUECKE replied that he had had another somewhat similar case. An actor, eight years ago, had had tracheotomy done on account of a syphilitic lesion of the larynx. He went back to Vienna, and two years ago he had "606" on two occasions. He had not been able to speak for eight years, nor breathe through the mouth. A few days ago he felt some tickling, which forced him to cough, and after causing him tremendous pain, a piece of bone came away about ½ in. square, partly necrosed. Then quite suddenly he found himself able to speak and breathe well. He did not know whether the "606" helped to extrude the necrosed bone.

Carcinoma of Left Vocal Cord; Operation; Arrest.

By G. SECCOMBE HETT, F.R.C.S.

MAN, aged 55, schoolmaster. Carcinoma of left vocal cord operated on two and a half years ago; thyrotomy; uneventful recovery. The growth came so near to the anterior commissure that it was found advisable to remove a small portion of the thyroid cartilage together with the anterior third of the right cord. Patient and section of growth were shown twelve months ago.[1] The case was then shown for the opinion of members as to whether vocal exercises might improve the voice. The patient has been treated by Mr. MacMahon, with great improvement to his phonation. He is following his occupation, and teaches a class of boys.

The PRESIDENT said this patient came to him two years ago, but operation was done by Mr. Hett when he (the President) was ill. Two and a half years ago it was shown as a case of good recovery, but the patient was voiceless. Mr. MacMahon had been doing something for him in the way of vocal exercises, and those who now heard the patient's voice to-day would have noted considerable improvement. In such cases a false cord often was produced, and a fairly good voice ensued. When this did not occur it was a question whether we might hope that, as in this case, vocal exercises might establish a better voice.

---

[1] *Proceedings*, 1912, v, p. 151.

Double Abductor Paresis and Stricture of Deep Pharynx and Upper End of Œsophagus, after accidentally Swallowing Glacial Acetic Acid in October, 1912.

By William Hill, M.D.

Patient has been dilated up with Brünings's dilator (in January of this year); better for two months. Recently stricture symptoms reappeared. Intubated; swallows by side of tube.

DISCUSSION.

Dr. Dan McKenzie said that there was an event in partial stricture of the œsophagus which had happened twice in his experience, and that was blocking of the stricture with food, whereby a partial was converted into an absolute obstruction. The first case was that of a woman who came to him with absolute inability to swallow, of sudden onset. Even liquids returned. He found himself unable to pass a large œsophageal bougie, but succeeded in getting a soft rubber catheter to pass. After removing it he tried the swallowing but the obstruction remained absolute, so he re-inserted the catheter and poured in some milk through it into the stomach. The patient had had nothing to eat or drink for some time, and the sudden ingestion of cold milk made her sick. She vomited the milk and with it a whole green pea. Immediately thereafter he found that the power of swallowing was quite restored. Further examination showed that the patient had an aneurysm. The explanation of this history was that the aneurysm had induced an obstruction of the gullet permeable in the ordinary way, but still so small that it could be perfectly blocked by a green pea, which acted like a ball valve, permitted the rubber catheter to pass, but was not displaced until the fluid propelled from below in the act of vomiting carried it away. This case, which he had seen several years ago, he had published at the time in the *British Medical Journal*.[1] The second case had been seen by him at the Central London Throat and Ear Hospital about a fortnight ago, the upshot being less fortunate than that of the case he had just narrated. The patient, a man, had had several distinct attacks of complete œsophageal obstruction, all of which had until then been relieved spontaneously. X-ray examination showed the stricture to be located at the cardiac orifice. The œsophagoscope, when inserted, plunged into a sacculated œsophagus full of dirty fluid in which were floating masses of half-chewed meat. These masses blocked up the orifice of the aspirator so frequently that the emptying of this sac was a tedious and laborious task. After the liquid had been got rid of, it was found that the œsophagus was blocked by about half-a-dozen chunks of chewed meat which had to be removed with Brünings's forceps before the actual stricture was reached. Finally, one of Hill's feeding tubes was inserted, and by it the patient was fed for twenty-four hours. At the end of that time, however, he insisted on the removal of the tube, and in the absence of the speaker this was done. As the patient would not allow any further interference from above, a gastrostomy was performed, but a few days later he died. The record of the case was incomplete, as a post-mortem examination was not made. The only evidence as to the nature of the stricture was negative; the surgeon who performed the gastrostomy was unable with the finger in the stomach to find any sign of disease about the cardiac orifice, while the speaker had seen no signs of growth while working with the œsophagoscope.

---

[1] *Brit. Med. Journ.*, 1907, i, p. 491.

Mr. WAGGETT asked Dr. Hill whether he found that his patients preferred the feeding tube in the mouth in preference to the nose. His own experience was that it was preferred through the nose.

The PRESIDENT said his experience with such patients was the same as that of Mr. Waggett.

Dr. PETERS asked whether dilatation was so helpful in these cases as the passage of a small tube. Apparently there was an interference with the musculature of the wall, and probably it was that more than stenosis, which prevented the passage of food. So that probably the passage of a small tube was quite as efficient as dilatation. There was always a tendency to recontraction. The question of nasal versus mouth feeding was largely a question of nasal obstruction. If the nose was obstructed or there was mechanical difficulty, the passage of even a soft tube was very irritating, whereas if the patient habitually breathed through the nose freely it was easy to feed by the nose.

Dr. DONELAN said it might be interesting to recall that the first person who recommended feeding patients by means of a tube passed through the nose instead of the mouth was Dr. W. Myles, of the Richmond Asylum, Dublin, who some thirty years ago introduced that system. All patients who had to be fed in this way seem more comfortable with the tube through the nose. Of course, much depended on the size of the nasal passage and whether there were any septal projections liable to be irritated. This was of great importance in cases like the present where the tube had to be permanently retained. Tubes made specially with a soft nasal portion gave good results in these cases.

Laryngological Section.

May 2, 1913.

Mr. HERBERT TILLEY, President of the Section, in the Chair.

Nearly Complete Paralysis of Left Vocal Cord of Unexplained Ætiology.

By WILLIAM HILL, M.D.

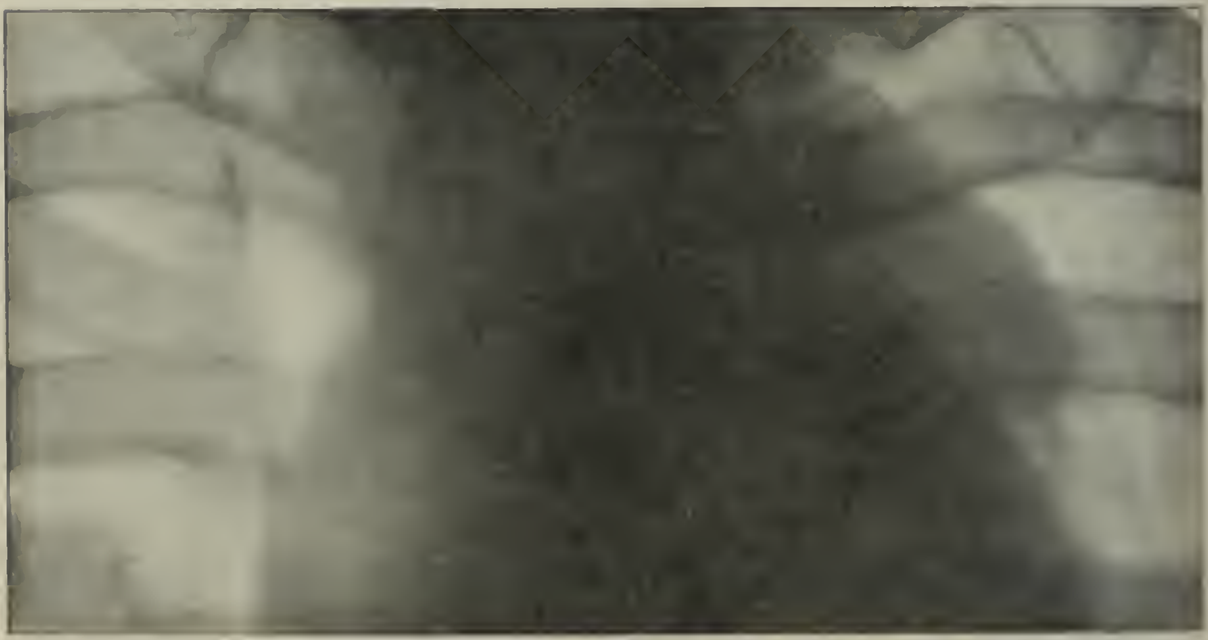
MALE, aged 24, came to the throat department at St. Mary's Hospital on April 4 of this year, complaining of loss of voice which followed the operation of internal urethrotomy three weeks before. On examination with the throat mirror the left cord was immobile and shorter than the right, the left arytænoid was in a considerably more forward position than the right and prevented sufficient approximation of the right cord to the paralysed left cord on attempted phonation The laryngoscopic picture suggests *long-standing* paralysis with post-paralytic contracture, which is not what one expected to find in view of the patient's statement that he noticed no dysphonia until after the operation in March of this year. He contracted gonorrhœa four years ago, and there is no history of this having been followed by arthritis. Examination of the neck and chest by the usual methods (including the X-rays) throws no light on the cause of the paralysis. The laryngoscopic picture closely resembles that figured in Morell Mackenzie's "Diseases of the Throat and Nose," p. 448, of a patient with long-standing dysphonia and paralysis of the left recurrent nerve of unascertained cause. Is the assumption correct that the laryngoscopic appearances in this case indicate *long-standing* unilateral paralysis? If so, what is the explanation of this sudden and recent onset of dysphonia?

[*Note* (made one month subsequent to the meeting).—The voice has much improved. There is fair movement of the cord, but the left arytænoid still occupies a more advanced position than the right, and does not move so freely.]

Skiagram of Aneurysm of the Arch and Descending Aorta of which Physical Examination of the Chest gave no Indication.

By WILLIAM HILL, M.D.

AN old man from whom this skiagram was taken was shown by Dr. Hill at the Laryngological Section on December 1, 1911.[1] He came to hospital complaining of hoarseness; as the left vocal cord was paralysed he was sent to Sir John Broadbent with a request to ascertain if there were any indications of aneurysm on physical examination. Sir John reported in person that a careful examination of the chest revealed no positive evidence of aneurysm, but in view of the paralysed left cord and the unequivocal tracheal tugging (which he there and then demonstrated) he had no doubt whatever that an X-ray examination would confirm the diagnosis of aortic aneurysm. The skiagram shows that quite a large aneurysm may be overlooked if physical examination of the chest *alone* is relied on. Tracheal tugging, *inter alia*, should always be looked for in all adult cases with left recurrent paralysis.



Portion of X-ray photograph (somewhat reduced) of Dr. Hill's case of aortic aneurysm.

---

[1] See *Proceedings*, 1912, v, p. 35 *et seq.*

Notes of a Case of Left Recurrent Laryngeal Paralysis, probably due to Dilatation of the Left Auricle.

By E. D. Davis, F.R.C.S.

Mrs. P., aged 40, had well-marked mitral stenosis with hæmoptysis and failure of compensation. In 1908 she had been treated by Dr. Cordes, of Berlin, for loss of voice, by rest in bed and faradization of the larynx, and after treatment for two months the voice returned. In March, 1911, she again complained of loss of voice and stated that she had been sent to Margate for bronchitis and hæmoptysis and that the sputum had been examined for tubercle bacilli with a negative result. She had been in bed for three weeks, but there was no improvement in the voice, though the bronchitis was better. An examination showed more or less complete paralysis of the left recurrent laryngeal nerve with slight adductor movement and a little laryngitis. The skiagrams of the chest are shown. The X-ray screen revealed dilatation and displacement of the heart to the left and an opaque posterior mediastinum. Rest in bed improved the laryngitis but not the paralysis.

Left Recurrent Laryngeal Paralysis following Acute Endocarditis and Pericarditis.

By E. D. Davis, F.R.C.S.

Mr. Q., aged 19, was extremely ill in July, 1912, with heart failure, mitral regurgitation, and pericarditis. When Dr. Wiltshire saw him in July the voice was weak and hoarse. The larynx was examined when the patient was convalescent, in February of this year, and complete left recurrent laryngeal paralysis, with slight compensatory over-action of the right cord was found. Skiagrams were shown.

Case of Right Recurrent Laryngeal Paralysis.

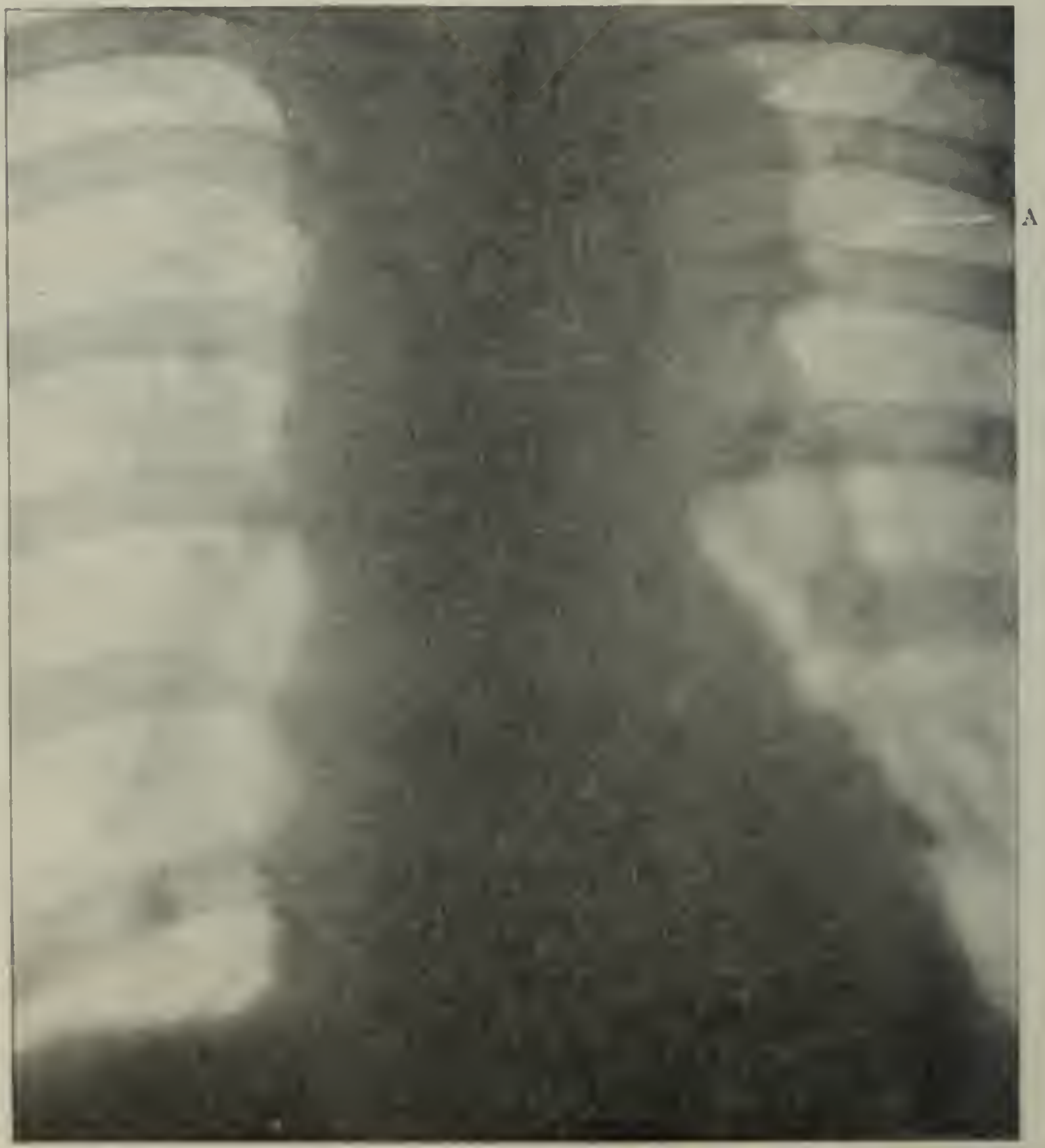
By E. D. Davis, F.R.C.S.

Mr. G., aged 34, complained of deafness of the right ear following influenza. Incidental examination of the larynx showed right recurrent laryngeal paralysis, with over-action of the left cord. The palate and pharynx were normal. The voice was toneless, and the patient stated that he had lost his voice years ago. Skiagrams were shown, but no definite cause of the paralysis could be discovered. Physical signs at the apex of the right lung were obscure.

Case of Left Recurrent Laryngeal Paralysis.

By Cecil Graham, F.R.C.S.

A. C., male, aged 44. Weakness of voice since June, 1912. Occasional attacks of coughing, followed by vomiting. No hoarseness, no dysphagia, no enlarged cervical glands. Syphilis twelve years ago.



Skiagram (antero-posterior view) of Mr. Graham's case, showing great exaggeration of aortic shadow (A).

Wassermann reaction positive. Shortening of left vocal cord; tilting forward of left arytænoid. Left cartilage of Wrisberg well defined. Radial pulses synchronous, and fairly full. Sluggish left pupil. Skiagram shown (*see* figure).

Discussion on the Ætiology of Unilateral Paralysis of the Recurrent Laryngeal Nerve.

Opened by F. DE HAVILLAND HALL, M.D.; Sir DAVID FERRIER, M.D., F.R.S.; and W. PERMEWAN, M.D.

DR. DE HAVILLAND HALL: In order that the question of ætiology of unilateral recurrent paralysis may be discussed in a systematic manner, and from all points of view, it seems to be essential that we should have a framework upon which to hang our facts. After careful consideration of the subject, I think that it would be impossible to draw up a more complete and scientific table of the causes of the recurrent paralysis than that compiled by Sir Felix Semon and adopted by Mr. Herbert Tilley in "Diseases of the Nose and Throat." So complete is the table that I have only one cause to add to the list—viz., dilatation of the left auricle, usually in connexion with mitral stenosis. I will give the table, therefore without further preface:—

(I) BULBAR AND BULBO-SPINAL AFFECTIONS.

(1) Hæmorrhage and softening.
(2) Syphilitic processes.
(3) Tumours.
(4) Diphtheria.
(5) Progressive bulbar paralysis.
(6) That curious form of systemic central nervous disease, first described by Hughlings Jackson and Morell Mackenzie, in which one-half of the tongue, the corresponding half of the palate, the corresponding vocal cord, and in a number of cases the corresponding trapezius and sternomastoid muscles are affected.
(7) Amyotrophic lateral sclerosis.
(8) Disseminated cerebrospinal sclerosis.
(9) Syringomyelia.
(10) Tabes dorsalis.

(II) PERIPHERAL AFFECTIONS.

(1) Acute rheumatic influences.
(2) Catarrhal neuritis.
(3) Toxic influences (lead, arsenic, &c.).
(4) Tumours in the posterior cavity of the skull, or in the foramen lacerum or foramen jugulare.
(5) Pachymeningitis.
(6) Traumatism (unintentional ligature of nerves, injection of iodine into a goitre, cut throat, stabbing, injury during extirpation of a goitre, &c.).
(7) Tumours of neck (goitre, peritracheal glands, &c.).
(8) Aneurysms of the arch of the aorta, innominate, subclavian, carotid.
(9) Mediastinal tumours (malignant, tuberculous, calcification of bronchial glands, &c.).
(10) Pericarditis.
(11) Pleurisy.
(12) Tuberculosis and pleuritic thickening of apex of right lung.
(13) Chronic pulmonary affections (chronic pneumonia, anthracosis, &c.).
(14) Infectious fevers (typhoid, &c.).
(15) Œsophageal carcinoma.

That I might have some concrete facts upon which to base a discussion I have carefully gone through the *Proceedings* of the Laryngological Society from its foundation until it ceased to exist as an independent Society—i.e., from 1893 to 1907. I have come across fifty-two cases of unilateral laryngeal paralysis. In thirty-five cases the left vocal cord was affected, in sixteen cases the right, and in one case the affected side is not mentioned. The following table gives a detailed list of the causes of the laryngeal paralysis:—

CASES OF UNILATERAL LARYNGEAL PARALYSIS FROM THE LARYNGOLOGICAL SOCIETY.

	Cord affected	
	Right	Left
Aneurysm of arch of aorta	1	7
,, ,, (subclavian)	1	0
Mitral stenosis and enlarged left auricle	0	2
Enlarged bronchial and other glands	1	6
Disease of apex of lung	1	0
Malignant disease of œsophagus	1	3
Thyroid tumours (? malignant)	0	1
Influenzal ... (vocal cord not stated, 1) ...	2	0
Diphtheria, lead (one each)	0	2
Neuritis	1	1
Tabes, syringo-myelia, disseminated sclerosis, bulbar paralysis, general paralysis of insane	2	5
In combination with other paralyses, as hemiplegia, facial, palate, pharynx, trapezius, and sterno-mastoid	6	4
Doubtful cause	0	4
(Side not stated, 1)	16	35

I have collected a further series of sixty-four cases of unilateral recurrent paralysis which I have observed myself. They are as follows:—

	Right	Left
Aneurysm of arch of aorta	2	21
Dilated left side of heart	0	2
Malignant disease of lung	0	8
New growths in thorax	0	5
Malignant disease of œsophagus	8	5
Thyroid tumours	3	1
Neuritis	3	1
Bulbar paralysis, tabes	1	1
Doubtful cause	0	3
	17	47

TABLE OF THE COMBINED FIGURES TAKEN FROM THE LARYNGOLOGICAL SOCIETY'S *Proceedings* AND THE CASES I HAVE OBSERVED MYSELF.

	Right		Left
Aneurysm of arch of aorta	3	...	28
,, ,, ,, (subclavian)	1	..	0
Mitral stenosis and enlarged left auricle	0	...	4
Enlarged bronchial and other glands	1	...	6
Disease of apex of lung	1	...	0
Malignant disease of lung	0	...	8
New growths in thorax	0	...	5
Malignant disease of œsophagus	9	...	8
Thyroid tumours	3	...	2
Influenza ... (vocal cord not stated, 1) ...	2	..	0
Diphtheria, lead (one each)	0	...	2
Neuritis	4	...	2
Tabes, syringomyelia, disseminated sclerosis, bulbar paralysis, general paralysis of insane	3	...	6
In combination with other paralyses, as hemiplegia, facial, palate, pharynx, trapezius, and sterno-mastoid	6	...	4
Doubtful cause	0	...	7
(Side not stated, 1)	33	...	82
Total	116		

Though the figures I put forward are comparatively few in number, still I think that they are sufficient to allow of some definite conclusions being formulated.

(1) The most common cause of left recurrent paralysis is aneurysm of the arch of the aorta. This occurred in twenty-eight times out of eighty-two cases. I would further point out that the seven cases in which no definite cause for the paralysis was discovered were all on the left side. Some of these seven were almost certainly aneurysmal, as long clinical experience has taught me that paralysis of the left vocal cord is often the only objective indication of aortic aneurysm. In a case of this kind, under my late colleague, Dr. Fincham, at the Westminster Hospital, I detected the cadaveric position of the left vocal cord nearly a year before there were any other definite physical signs of the aneurysm. In these days the question would have been easily settled by an X-ray examination.

(2) In cases of aneurysm of the arch of the aorta the left recurrent nerve is almost exclusively affected. This is shown by the fact that out of thirty-one cases of paralysis of the recurrent nerves from the pressure of an intrathoracic aneurysm, the left recurrent nerve was affected in twenty-eight cases, and the right in only three. In the Lumleian Lectures, recently delivered before the Royal College of Physicians, I

showed that paralysis of the left recurrent nerve not only points very clearly to the probability of the existence of an intrathoracic aneurysm, but it also indicates the position of the aneurysm as being seated usually on the transverse or descending part of the arch of the aorta. In thirty-five cases of aortic aneurysm recurrent paralysis was observed in twenty-one cases—nineteen times on the left side and twice on the right.

(3) The physical signs of valvular disease of the heart may exist in association with left recurrent paralysis, so as to very closely simulate intrathoracic aneurysm. Before the advent of the X-ray method of examination these cases were probably frequently mistaken for aneurysm.

(4) When the paralysis is due to the effect of pressure other than aneurysmal the left recurrent nerve is affected nearly four times more frequently than the right. If the cases of malignant disease of the œsophagus be excluded, it might be stated baldly that the right recurrent nerve is hardly ever paralysed as the result of pressure within the thorax. It also appears that, after paralysis of the left recurrent due to aneurysm, the most common cause of this paralysis is the pressure of some growth within the thorax. This very striking difference between the two recurrent nerves must be owing entirely to their anatomical distribution. It is easily seen why an aneurysm of the arch of the aorta should almost exclusively affect the left recurrent nerve, but it is difficult to understand why the right recurrent nerve should almost entirely escape the effect of other kinds of pressure.

(5) In cases of malignant disease of the œsophagus my figures show that the two sides are almost equally affected—i.e., nine cases of right recurrent paralysis and eight cases on the left side. This is as might have been expected, there being no reason why one nerve should be more often involved than the other in cases of cancer of the œsophagus.

(6) The occurrence of paralysis of the right recurrent nerve associated with dysphagia is almost invariably due to malignant disease of œsophagus. The same cannot be stated of left recurrent paralysis with dysphagia, but we should be justified in saying that the latter combination is most commonly due to malignant disease of the œsophagus. In exceptional cases dysphagia may be caused by an aneurysm of the descending thoracic aorta pressing on the œsophagus, while at the same time the left recurrent nerve is implicated in an aneurysmal dilatation of the arch of the aorta.

(7) When recurrent paralysis is due to central causes or toxins the

nerves are affected nearly equally. My figures show fifteen cases of right recurrent paralysis and fourteen of left recurrent paralysis.

(8) Age is an important factor in the diagnosis of the cause of the the paralysis. In children one would naturally think of diphtheria, tuberculous glands, cervical spinal caries, and meningitis. In young adults, pulmonary tuberculosis, pleuritic thickening at the apex of the lung, and mitral disease with enlargement of the left auricle would be the most likely causes. Under the age of 25 aneurysm is extremely rare. In middle-aged men—i.e., from 25 to 55—aneurysm is by far the most common cause. After the age of 60 the probability of malignant disease of the lung or of the mediastinal glands should be borne in mind.

The sex of the patient should also be taken into account, as thoracic aneurysm is a comparatively rare disease in females; therefore, left recurrent paralysis in a woman would not be of the same value in suggesting the presence of an aneurysm as in the case of a man. In the Lumleian Lectures I quoted figures to show that thoracic aneurysm occurred in men as compared with women in the proportion of eight to one. Recurrent paralysis in a woman would suggest the pressure of a new growth, malignant disease of the œsophagus, or dilated left auricle rather than an aneurysm.

CASE ILLUSTRATING LEFT RECURRENT PARALYSIS.

M. L., female, aged 19, consulted Dr. de Havilland Hall on June 8, 1912, complaining of hoarseness and choking when she drank, the choking being worse with hot than with cold fluids. Left vocal cord in cadaveric positions. Impulse in fifth space, mid-clavicular line. Increased area of cardiac dullness. Double aortic and double mitral murmurs. Right pupil larger than left. Right pulse larger than left. History of rheumatic fever at the age of 6 or 7. Has suffered from rheumatism since. Skiagram shown.

Sir DAVID FERRIER, F.R.S.: Though I have ventured, on the invitation of your President, to take part in this discussion, I do not intend to occupy your time with any disquisition on the various causes of recurrent laryngeal paralysis, their diagnostic indications, or their relative frequency. Naturally, everything that tends to impair the vitality and conductivity of the nerve, such as pressure, neuritis, however caused, and structural changes in general, will have the same ultimate effect. The paralysis so induced may be complete or incomplete. In the complete form all the muscles innervated by the recurrent laryngeal are paralysed, and the vocal cord is in the cadaveric position. In the incomplete form the paralysis, or paresis, affects mainly, or exclusively, the posterior crico-arytænoid, and the vocal cord is immobile or nearly so, in the median position. As to the relative frequency, the incomplete is by far the most frequent form of recurrent laryngeal paralysis.

On what depends its special feature? Many years ago when I was engaged writing a paper on the "Localization of Atrophic Paralyses,"[1] in which I endeavoured to show that in peripheral paralysis, from whatever cause, neuritis, &c., the extensor muscles were the first to suffer. Sir Felix Semon called my attention to the fact that the abductors of the vocal cords were the first muscles to be paralysed in affections of the recurrent laryngeal nerve. I at once saw that this fell in line with the other facts on which I had based my conclusions. These may be summarized as follows:—

In peripheral neuritis, however induced, as from alcohol, lead, arsenic, beri-beri, &c., the extensor muscles of the limbs are the first, and often alone, affected. In lead poisoning we have the familiar drop-wrist, while the supinator longus supplied by the same nerve escapes. So in alcohol we have at first drop-foot from paralysis of the muscles supplied by the external popliteal nerve. A similar condition obtains in beri-beri. Take again the case of pressure on the peripheral nerves. While severe and long-continued pressure on the musculo-spiral nerve causes paralysis of all the muscles supplied by this nerve—supinators as well as extensors—yet instances occur in which only the extensors are affected. So also in puerperal paralysis from pressure of the fœtal head on the crural plexus, the muscles especially paralysed are the anterior tibial group supplied by the external popliteal nerve. The same thing happens in neuritis of the sciatic nerve, or when it is injected with Schlösser's fluid for the treatment of sciatica. All these facts point to a greater vulnerability of the extensor nerves to destructive influences. Parallel with this, and of the same significance, is the fact discovered by Onimus, that the extensor nerves lose their excitability after death sooner than the flexors and adductors. The greater vulnerability of the abductor fibres of the recurrent laryngeal, as exhibited in the effects of neuritis, pressure, cold, &c., is only an example of a more general law applicable to extensors in general. So far the law.

As regards the recurrent laryngeal paralysis so common in tabes, the form with which I am most familiar, the question is whether it is due to central or peripheral causes, or perhaps both. Opinion is still divided on this question, and I am bound to say that after reviewing the principal literature bearing on it, I think that there are many points still requiring careful investigation by modern methods, and with more accurate anatomical knowledge of the nerve-centres than has been displayed in many of the published clinical records. There is, however, no doubt that, in the vast majority of cases of tabetic recurrent paralysis, neuritic or degenerative changes have been found in the vagus trunk, recurrent laryngeal, or in the intramuscular nerve-endings, particularly in the posterior crico-arytænoid muscles. Though degenerative changes have also in several instances been described in the medulla oblongata, particularly in the floor of the fourth ventricle, it is questionable whether in any case of pure tabetic laryngeal paralysis of the usual type, primary degeneration has ever been demonstrated limited to the nucleus ambiguus, the recognized motor nucleus of the laryngeal muscles. So far as I have been able to discover there are only two cases of tabes on record in which primary central lesion appears to have been demonstrated. The one is the case recorded by v. Reusz,[1] the other by a Russian lady whose name I cannot venture to pronounce — Valerie Wyscheslawtzewa — quoted by Grabower.[2] In both of these cases, however, there was complete recurrent paralysis; and in one of them (v. Reusz's) there was paralysis also of the pharynx, palate, and partially of the tongue. These cases, therefore, cannot be regarded as typical of the condition usually found in tabes. And in those cases in which degenerative changes have been described in the nucleus ambiguus among others they may have been secondary to peripheral lesion—the so-called "réaction à distance," or retrograde degeneration.

---

[1] *Brain*, 1881-82, iv, pp. 217, 303.

In illustration of the further remarks I have to offer on this question I would beg to remind you of the anatomy of the *nucleus ambiguus*, the motor nucleus of the ninth and tenth cranial nerves. The nucleus ambiguus lies in the reticular formation ventral to the grey matter of the fourth ventricle, as shown in the first slide. The second is a schematic representation of the relative position of the motor and sensory nuclei of the medulla oblongata. The third is a schematic diagram of the roots of the vagus. One branch (the sensory) goes to the fasciculus solitarius; a second to the medio-dorsal nucleus, the exact functional signification of which is not quite determined, though probably visceral; and a third, the motor root proper, to the nucleus ambiguus.

---

[1] *Arch. f. Psychiat.*, Berl., 1899, xxxii, pp. 535-49.

[2] *Arch. f. Laryng. u. Rhinol.*, Berl., 1910, xxiii, p. 59.

The nucleus ambiguus constitutes a column of cells several millimetres in length, and according to the researches of Kosaka on dogs[1] is capable of differentiation into three subdivisions—an upper, middle, and lower, as seen in the figure before you. The upper is the motor nucleus of the pharynx, œsophagus and crico-thyroid. The middle is the motor nucleus of the palate. The lower is again divisible into two—viz., a ventral and a ventro-lateral. The ventral is the motor nucleus of the recurrent laryngeal, and the ventro-lateral of the inhibitory nerve of the heart. The individual muscles of the larynx have no doubt their own cell groups, but they have not been separately differentiated.

Now, if one considers the relatively small size of the cell groups constituting the nucleus, and their community of vascular supply, it would appear very unlikely that any acute lesion, such as that of anterior poliomyelitis, could pick out the cell groups of some only of the laryngeal muscles, or even all, without implicating to a greater or less extent those also of the palate and pharynx. As a matter of fact, this occurred in the case recorded by v. Reusz; and in the symptom-complex due to embolism of the posterior cerebellar artery paralysis of the palate and larynx are always associated with each other.

It is, however, theoretically possible that a chronic and slowly progressive degeneration, like that of muscular atrophy or bulbar paralysis, may pick out the cell groups of the abductors apart from the others. But I know nothing in the symptomatology of muscular atrophy which would support this contention. The extensor muscles are never individually affected in this disease. And in bulbar paralysis, in which the lips, tongue, pharynx and larynx are progressively affected, the weakness of the adductors of the vocal cords is the first symptom to attract attention to the larynx. Whether this is preceded by paresis or paralysis of the posterior crico-arytænoid muscles I have no observation of my own, nor have I seen it recorded as a phase in the symptomatology of bulbar paralysis. Schlesinger,[2] however, holds that this occurs in bulbar syringomyelia; but Iwanow,[3] who has directed special attention to this point, has never, in the twenty-eight cases he examined, seen one in which there was paralysis of the posterior crico-arytænoid without implication also of some of the other laryngeal muscles. The point is, however, one well worthy of further investigation.

---

[1] *Neurol. Centralbl.*, Leipz., 1909, xxviii, p. 406.

[2] "Die Syringomyelie," 1902.

[3] *Neurol. Centralbl.*, 1907, xxvi, p. 1115.

Taking all the facts into consideration, and pending further precise examination of the recurrent laryngeal nerves and their motor nuclei, I am inclined to adopt the view already expressed by many eminent laryngologists and neuropathologists—e.g., Cahn, Dejerine and Petren, Oppenheim, &c.—that the recurrent laryngeal paralysis usually observable in tabes is of peripheral origin, and conforms to the law applicable to mixed motor nerves in general—viz., that the extensors and abductors are more vulnerable and lose their vitality sooner than the flexors and adductors.

Dr. W. PERMEWAN: In an attempt to ascertain the various causes of unilateral laryngeal paralysis, and the relative frequency in which they occur, it is plain that an accurate result could only be arrived at by the publication and collation of every observed case. That is an impossibility at the present moment, and indeed even an approximation to that ideal is very difficult to attain. Various causes contribute to this state of things: in the first place the majority of general physicians and surgeons do not even yet practise laryngoscopy themselves, or habitually call in to their assistance those who do. Secondly, in the early stages of unilateral paralysis symptoms are, as a rule, either absent or so inconspicuous as not to attract the attention of the physician, unless he is especially on the look out. I think it essential at this point once more to repeat what is a commonplace to us, but which is by no means generally recognized or acted upon—viz., that in the first stage of unilateral organic paralysis there is no affection of voice, as the abductors are alone affected, and no affection, or a very slight affection of breathing, because the other cord is able to make up the deficiencies. Thus it is that unilateral abductor paralysis is often missed, or only discovered by accident.

The records of cases are also by no means complete. There is a natural failure to record cases which are due to the commonest causes. It is of little interest to publish cases, for instance, of left-sided paralysis due to aortic aneurysm, while any unusual or obscure case is carefully put on record. The result is that there is in any statistical statement an undue relative predominance of rare cases. So too, in studying and comparing various collections of cases made by different authors, it is difficult to avoid the error due to the frequent repetition of the same case in various connexions. The results, therefore, of statistical inquiry cannot at present be taken as in any way of absolute value. But, as on the other hand the individual experience of any one observer is insufficient to establish general results, the study of records is the only way of arriving at even an approximation to the truth.

I have given in this paper two sets of recorded cases: one, the 150 cases published twenty-two years ago by Avellis from the Clinic of Schmidt, of Frankfort; the other, the result of the collation of all cases recorded during the past ten years in the *Centralblatt für Laryngologie* and the *Journal of Laryngology*, checked by reference to the French laryngological journals. I think it may be taken as true, that the *Centralblatt*, under the guidance of our master in this subject, Sir Felix Semon, is not likely to have missed anything of importance in relation to laryngeal paralysis.

In the year 1891 Avellis[1] published an analysis of 150 cases of recurrent paralysis from Dr. Moritz Schmidt's Clinic. Out of these 150 it is noticeable that not much more than one-half—viz., either seventy-eight or eighty-five—were traced certainly to their source. Nor, in fact, is it stated that any considerable proportion of these were confirmed by post-mortem examination. Still, observed as they were by the best clinicians of that day, they stand as an indication, more or less accurate, of the various causes which lead to unilateral laryngeal paralysis. It is convenient, therefore, to take these observations as a starting point, and I will rapidly detail them to you. Two striking facts are, that of 150 cases 106 were in men and only 44 in women. Twelve were bilateral and therefore do not concern us to-day, but of the unilateral cases ninety-two were paralysis of the left cord and forty-six of the right cord. It is very strange that in the abstract given in the *Journal of Laryngology* the relative frequency of left-sided and right-sided cases has been reversed. The two striking facts are that men are very much more liable than women, and also that left-sided paralysis occurs much more frequently than right-sided paralysis. On p. 149 is a list of the cases as given.

As to individual causes, in Avellis's seventy-eight ascertained cases, the most frequent cause—viz., in twenty-four cases—is aneurysm; of these only two were in women. Next to aneurysm come fourteen cases of thyroid enlargements or growths, twelve cases of tubercular infiltration of the lung, seven of glands in the neck, and five of cancer of the œsophagus. Of the less frequent lesions I will only mention the one case of pericarditis, the two cases of abscess due to disease of cervical vertebræ, and the one, and one only, case of paralysis due to disease of the bronchial glands.

---

[1] *Berl. Klinik*, 1891, 40, Hft., pp. 1-26.

Here, then, is a *catalogue raisonnée* of a considerable number of cases observed by the methods of twenty-two years ago. It is quite plain that at that date it was impossible for the best observers to detect the cause of unilateral paralysis in more than about one half of the cases under their observation. It is highly improbable that at the present day such a failure of diagnosis would have to be recorded. For that progress there are, I think, at least several causes. First, of course, the discovery of the Röntgen rays; secondly, the knowledge of the existence of laryngeal palsy in the chronic diseases of the medulla and spinal cord; thirdly, the appreciation of the various toxic conditions that can and do affect the motor nerves of the larynx from their source to their termination; and, fourthly, the attention that has been paid since 1897, but paid, as I shall suggest with some want of discretion, to the fact that diseases causing enlargement of heart are sometimes associated with implication of the recurrent nerve, and paralysis of the left side of the larynx. Of these causes of improved diagnosis at the present day the use of the X-rays is the most important. It is now possible

AVELLIS'S FIGURES PUBLISHED IN 1891.

CAUSE OF PARALYSIS.

Tubercular infiltration of lung :—		
Right	7	12
Left	5	
Enlarged gland in neck		7
Abscess of cervical vertebræ		2
Goitre		14
Pericarditis		1
Tumour of œsophagus		5
Aneurysm		24
Cerebral disease		1
After operation on goitre		1
After tracheotomy		1
After syphilis		3
? Paralysis or contracture		2
Pleuritis sicca		2
After diphtheria		1
Bronchial gland		1
With furuncle in neck		1
		78
Unascertained cause		72
Total		150

to diagnose an aortic aneurysm (but not all of them) in the absence of physical signs by radiography. So, too, it is possible to distinguish in the same manner between an aneurysm and enlargement of the left auricle: and the discovery of enlarged bronchial, mediastinal and peri-tracheal glands is an easy matter for the radiographer. Only in the last two months I have seen a case in which I suspected aortic aneurysm from the existence of left-sided paralysis, and in which there were no other signs whatever, at once cleared up by a screen examination by the X-rays. It may be stated with some confidence that the number of cases of laryngeal paralysis due to chest conditions which escape diagnosis as to the cause, will, if competent search is made by X-rays, become in future very small.

I know no more scientific classification of the causes of unilateral paralysis than that given by Sir StClair Thomson in his work on "Diseases of the Throat." He takes the motor nerves of the larynx from their origin in the medulla down to their termination in the laryngeal muscles and considers what disease may affect them in the long course. I say from the medulla, because, in spite of some alleged cases recorded by Casselberry and others, I do not think it is established that there have been in reality any instances of unilateral paralysis due to disease of the cerebral cortex, or the tracts from the cortex to the medulla. Thomson's classification is both exhaustive and complete. I have taken the liberty of reproducing it, and I hand round copies, showing the relative frequency in recorded cases of the various lesions given in the test.

RECORD OF THE PAST TEN YEARS.

UNILATERAL LARYNGEAL PARALYSIS.

Analysis of cause in 360 cases.

(1) *Cerebral lesions* (Casselberry) ... ... — ...		6
(2) *Bulbar lesions*:—		
(*a*) Vascular, thrombosis, embolism, hæmorrhage		1
(*b*) Syphilitic		4
(*c*) Tumour, aneurysm, abscess		0
(*d*) Diphtheria		2
(*e*) Degeneration of nuclei:—		
Bulbar paralysis ...	1	51
General paralysis ...	0	
Tabes dorsalis ...	9	
Disseminated sclerosis	0	
Amyotrophic lateral sclerosis	0	
Syringo-bulbia ...	41	
Carried forward		64

Brought forward	64
(3) *Lesions of motor fibres in vagus and recurrent nerves :—*	
(*a*) Intracranial growths at base of brain	0
(*b*) Extracranial growths close to exit of vagus	1
(*c*) Traumatic lesions of nerves in neck :—	
(i) By horn of bull	4
(ii) Dislocation of clavicle	
(iii) By wagon : consecutive aneurysm of subclavian artery	
(iv) Injury in thyroid region	
(*d*) Injury during operations on thyroid gland	14
(*e*) "Traumatic" : either injury or during operation	45
(*f*) Thyroid enlargements and growths	10
(*g*) Pericarditis	0
(*h*) Pleuritic thickening at apex (cf. tubercle of lung)	1
(*i*) Aneurysm of arch of aorta	30
(*j*) Aneurysm of innominate artery	9
(*k*) Aneurysm of right subclavian artery	1
(*l*) Aneurysm of left subclavian or carotid arteries	0
(*m*) Enlargement of heart from mitral stenosis	10
(*n*) Broncho-pneumonia from irritating dust	1
(*o*) Tubercle at apex of lung	11
(*p*) Cancer of lung, with glands	4
(*q*) Enlarged bronchial glands	2
(*r*) Mediastinal growths	10
(*s*) Carcinoma of œsophagus	11
(*t*) Carcinoma of neck	1
(*u*) Peritracheal glands	2
(4) *Peripheral neuritis :—*	
Mineral poisons : lead	3
Vegetable poisons	0
Toxins of acute and other infections :—	
Diphtheria	2
Influenza	1
Rheumatic	1
From "cold"	1
"Toxic paralysis," cause not stated	95
(5) *Inflammatory lesions of abductor muscles :—*	
Injury from swallowing foreign body	3
Injury from washing out stomach	1
(6) *Other causes :—*	
Mediastinitis	1
Tumour of spinal cord	1
Tumour in nasopharynx	1
Left paralysis in right pneumothorax	1
Apical pneumonia	1
"Syphilis of aorta," cured by mercury	1
Pan-sinusitis of nose	1
Distortion of aorta and mediastinum by left-sided lung disease	1
Beri-beri : either toxic, or from cardiac hypertrophy or hydropericardium	1
Kypho-scoliosis	2
Poliomyelitis	1
Myotonia atrophica	1
Abscess around œsophagus	1
Following operation for adenoids	1
(7) *Unknown causes*	7
Total	360

Before I refer in detail to these results it will, I think, be useful to quote observations published in 1910 by Guder and Dufour on sixty-three cases of unilateral paralysis. Of these thirty-six were left-sided and twenty-seven right-sided. They read as follows:—

Aortic aneurysm	16
Two of these were right-sided and due apparently to co-existing innominate or subclavian aneurysm.	
Thyroid enlargements	7
Generally incomplete paralysis.	
Operations on the thyroid	11
Complete, but often recovered.	
Cancer of the œsophagus	7
Mostly of left cord.	
Cancer of the lung	4
? From pressure of glands.	
Tuberculosis of the lung	4
Either from glands or pleuritic thickening, or neuritis.	
Enlarged left auricle	2
Tabes dorsalis	4
Following washing out of stomach	1
Cause unascertained	7
Total	63

The figures of Guder and Dufour probably give something like the real relative frequency of the more common causes. As to the 360 cases given in the table, it is at once obvious that there is a very large and undue predominance of the toxic cases and those due to traumatism. Still, the very numbers show that these are frequent and important causes of unilateral paralysis, and it is probable that in toxic affections will be found the explanation of a considerable number of cases whose cause has not been definitely ascertained. The frequency of aortic aneurysm as a cause of left-sided paralysis is known to all of us. Statements have been made by myself, among others, that in left-sided cases when no other obvious cause is present, aortic aneurysm will be found to be the cause in a very large percentage of cases. What that percentage is exactly it is impossible to say. Very many cases of aortic aneurysm are never subjected to laryngoscopic examination. Many others are not detected at all till sudden death either suggests or reveals its existence. Some cannot even be detected by radiography, and in particular, so I am told by radiographists, just those small aneurysms of the under surface of the arch which particularly affect the recurrent laryngeal nerve. In the last edition of Schmidt's work on "Diseases of the Upper Air Passages" the editor says: "The commonest cause of paralysis of the left recurrent is aneurysm of the aorta. Among the symptoms of aortic aneurysm paralysis of the left recurrent is practically always the earliest, and it remains often for a long time the only sign. There are cases which remain to the end completely symptomless, so that they can only be diagnosed with great difficulty." Delavan, of New York, says practically the same thing. I have myself had experience of many cases in which the presence of an aneurysm was first shown by the onset of recurrent paralysis. I think we may conclude that, given a case of left recurrent paralysis, aortic aneurysm is the first thing to be thought of, and must not be excluded unless it has been sought for with every diagnostic aid at our command.

One cause of left recurrent paralysis, to which much attention has been given during the past sixteen years, is the association of it with mitral stenosis. The first recorded case was in 1897 by Ortner, and since then about forty cases have been described. By far the best analysis of these cases is that made by J. Garel in the *Annales des Maladies d'Oreille, &c.*, 1910.[1] While admitting fully the fact of left recurrent paralysis being associated with the heart changes which follow mitral stenosis, Garel points out that at least two-thirds of the cases were unconfirmed by an autopsy, and that even in those that were examined post mortem the account of the finding does not always carry conviction. One case which was diagnosed as due to pressure on the nerve from a dilated left auricle was found, on examination, to be really due to implication of the recurrent in glandular thickening. The suggestion that the left auricle when enlarged may compress the nerve against the arch of the aorta does not, to my mind at any rate, seem very convincing. The more probable explanation is that, when the heart becomes much increased in weight by hypertrophy of the right ventricle, that is enough to drag on the aortic arch, and thus stretch and eventually paralyse the nerve. I have shown to-day one heart much enlarged from mitral stenosis, and one enormously hypertrophied from a patent foramen ovale. Each of these cases, which were given me by my friend Dr. Nathan Raw, suffered for some time before death from loss of voice, but as no laryngoscopic examination was made—it was some years ago—I show them not so much as examples of

[1] *Ann. des mal. de l'oreille, du larynx* [&c.], Par., 1910, xxxvi (ii), pp 315-21.

recurrent paralysis from mitral disease, because the proof is absent, as to suggest that the greatly increased weight of the heart in this affection may well be considered the real factor in producing that paralysis of the nerve which we know to occur.

Unilateral paralysis in tabes dorsalis is by no means uncommon. Burger's great work of twenty years ago and the observation of Semon have fully established the fact that laryngeal paralysis is sometimes the earliest observed sign of this disease. Eighteen years ago I published some cases of paralysis of the larynx in general paralysis of the insane, and noted the occurrence of unilateral affection in a certain number of those cases. I have not repeated the observation, but have no doubt that from the close relationship of tabes dorsalis and general paralysis, laryngeal paralysis would often be observed to occur. In my table there are forty cases of paralysis from syringo-bulbia. It is not surprising that a disease which actually destroys by gross lesion the nuclei of the vagus accessorius should result in paralysis of the larynx. According to Ivanow, who observed these cases, the posticus is the first affected, and then the whole domain of the recurrent nerve. But often, in place of being strictly unilateral, there is complete paralysis of one side with affection of either the posticus or the internus of the other side. He is bold enough to suggest that Semon's law requires revision. The neurotic group of cases is a large one. The various causes are given in the table; they no doubt explain a considerable number of cases for which no clear organic cause can be found, and they are also the class of case, and possibly the only class of case, in which recovery occurs.

The bilateral representation of the movement of the laryngeal muscles in the cerebral cortex makes it extremely improbable that cerebral disease should produce unilateral paralysis. Yet Casselberry refers to six of such cases. Of course it is possible that destruction of both centres may occur at the same time: but until every case has been examined, and the existence of no disease of the medulla is demonstrated, it will be safer, in my judgment, to assume the non-existence of cerebral unilateral laryngeal paralysis.

In conclusion, I venture to suggest that if for the next ten years observers systematically put on record every case they meet with of unilateral paralysis, it will be possible then to do what is not possible now—viz., to establish the real relative frequency of the various causes.

Sir FELIX SEMON said that the subject chosen for this discussion was so large as to make it impossible within the limit of time accorded to a single speaker to discuss *all* the points in which he was interested. Thus he had reluctantly to pass by the questions of recurrent paralysis caused by mitral stenosis and of unilateral recurrent paralysis, said to be due to cerebral disease. He would limit himself to discussing the points raised by Sir David Ferrier.

Sir David had stated that laryngeal abductor paralysis, characteristic of partial lesion of the recurrent laryngeal, was only an instance of the more general law which he (Sir David) had endeavoured to establish many years ago—viz., that the nerves of the extensor muscles of mixed motor nerves are more vulnerable to destructive influences than those of the flexors and adductors. With regard to this statement Sir Felix wished to observe: (1) that the suggestion was as old as the proclamation of the fact itself, inasmuch as Ottomar Rosenbach had referred to the apparent analogy which Sir David wished to establish in his very first paper on the question; (2) that even if this analogy held good, it would only be an amplification, not an explanation, of the curious fact and would not elucidate in the least the cause of the vulnerability of the abductor fibres. But he (Sir Felix) gravely doubted, even after Sir David's interesting remarks, whether the laryngeal phenomenon could be claimed as a simple instance of Ferrier's more general law, although he fully admitted, of course, that it seemed to fall into line with it, inasmuch as the laryngeal abductors in one sense were as antagonistic to the adductors as were the extensors and flexors of a limb, seeing that they served opposite movements. But with this likeness the similarity ended, and for the rest the physiological conditions of the antagonistic muscles of the larynx were widely different from those of the antagonistic muscles of the limbs. He had discussed this question at length in Heymann's "Handbuch der Laryngologie," to which he would refer those interested in it, and would here only briefly recapitulate: (1) That, whilst the antagonistic muscles of the limbs served physiologically equivalent functions, those of the larynx served *two different* functions (phonation and respiration), which were differently represented in the cortex and in the medulla; (2) that Risien Russell had found that after division of the adductor fibres of both recurrents *no inhibition* of the abductors could be obtained on stimulating the cortex with strong induction currents, such as Sherrington had found in the case of genuine antagonistic muscles in other parts of the body; and (3), above all, that the laryngeal antagonists differed from other antagonistic muscles in the sense that *organic* progressive disease always attacked the *ab*ductors first or even alone, whilst in *functional* affections the *ad*ductors suffered similarly exclusively. He (the speaker) did not know of analogous conditions in any other part of the body. For all these and other reasons he was convinced that the mutual relations of the antagonistic muscles of the larynx were of a much more complex nature than those of the antagonistic muscles in other territories, and, in spite of the apparent analogy of which Sir David Ferrier had spoken, he could not admit that the conditions as observed in the larynx were a mere local illustration of Ferrier's general law.

With regard to Sir David's second proposition — viz., that the balance of evidence was in favour of the peripheral origin of tabetic laryngeal paralysis, he could not agree to this statement either. In his opinion that question was still quite open. The partisans of the exclusively peripheral theory had either ignored older carefully observed cases, such as his own, in which the microscopical examination of the nucleus ambiguus had been made by so great an authority as the late Dr. Beevor [Sir DAVID FERRIER: I remember that case, degeneration occurred in other nuclei in regard to which there were no symptoms at all—the tongue and so on], or had attempted to explain them away by maintaining that the medullary degeneration must be of secondary nature—a statement which so far had been neither proven or disproven. Altogether, the number of reliable post-mortem examinations, by which alone this question could be decided, was at present still much too small for that purpose, and he would exhort the members of the Section not to let a single opportunity slip to increase our knowledge of the subject, carefully examining in every case of tabes accompanied by laryngeal phenomena which ended fatally, whilst under their observation, all the parts in question from the nucleus ambiguus downwards. Personally, he could not understand why, as in the analogous case of the oculomotor paralyses of tabes, the original lesion might not be as well of a central as of a peripheral origin, and he would ask Sir David Ferrier why, if it were always peripheral, so frequently *bi*lateral abductor paralysis should be observed? But even if it could be shown that the laryngeal paralyses of tabes were always of peripheral origin, that would not in the least militate against the correctness of his law, the non-validity of which could be demonstrated in one way only—viz., by post-mortem examinations and microscopical investigations of the vagus-nucleus, which would have to show that whilst there were foci of degeneration in that nucleus the adductor muscles alone—or at any rate in a higher degree—were atrophic and degenerated, whilst the abductors had either entirely escaped or were, at any rate, less diseased than the adductors. Thirty-two years had now elapsed since the promulgation of his law, and in the whole of that time one single exception only had been actually established in a case of recurrent paralysis of peripheral origin (Saundby's), not a single one in a case of central causation.

And this brought him to Sir David's remarks about the initial adductor paresis sometimes observed in cases of *apparently* bulbar paralysis. That fact, too, had been recently brought forward as a proof against the validity of his law, although the observations in question had been of a clinical character only, and in not one single case had it been shown, by microscopical examination of the parts after death that, whilst the *highest* point in which foci of disease had been found was the nucleus ambiguus, the adductor muscles were exclusively or preponderatingly atrophic and degenerated. The reporters of such cases had obviously overlooked his statements in Heymann's handbook in which he had explained that cases of apparently bulbar paralysis, in which such initial adductor pareses were observed, did in reality not belong to the class of *bulbar* paralysis but to that of *pseudo*-bulbar paralysis—i.e., to that category in which foci of disease existed—either alone or in conjunction with actual bulbar lesions—*above* the laryngeal nucleus, viz., in the paths leading from the cortex through the corona radiata and the internal capsule to the medulla. Such cases, however, did not at all fall into the territory of his law, which only concerned the laryngeal nerves *from the nucleus of the vagus downward!*

In conclusion, he wished to say, with reference to Dr. Permewan's remark, that there had been lately a cry for "revision of Semon's law" that he heartily agreed with that demand. If it should be found by further investigation that the law was bad, the sooner it disappeared from accepted doctrines the better; if the law was good it would remain valid, as it had done now for more than thirty years, in spite of all attacks. He would loyally accept the result, but he must again emphasize that such a decision could only be arrived at on the strength of thorough and complete post-mortem examinations and microscopical investigations carried out by experts, not on the basis of purely clinical observations, which, as the past had abundantly shown, were open to numerous fallacies and mistakes.

Dr. WATSON-WILLIAMS said it was difficult for him to add points of interest in this discussion after the able papers of the introducers and the admirable speech of Sir Felix Semon. Those whose acquaintance with laryngology preceded the introduction of skiagraphy would admit that the value of laryngeal paralysis or paresis in cases suspected of aneurysm was not now so momentous as formerly, because in most cases skiagraphy would solve the problem. His experience was that the paralysis due to aneurysm was generally of the left cord. He would mention one of several similar cases which he saw before the X-ray days. The patient was an elderly gentleman with a history that whenever he went out he caught a cold, became hoarse—his liver was supposed to be upset; and it was on the latter account—as he (the speaker) was then practising as a physician—that he was asked to see the patient. The hoarseness led to examination of the larynx, and he was found to have left abductor paralysis. Though no other evidence of aneurysm was obtainable, the suspicion that he had that condition was so strong that he provisionally diagnosed the condition. His suggestion was that when he took exercise he increased the size of the aneurysmal sac and so the pressure effect on the left recurrent nerve was greater and consequently the paralysis. After several days' rest in bed he was sufficiently recovered to have only abductor paresis, whereas with exercise the thyro-arytænoideus internus was also paretic. He asked whether such a variation in degree due to aneurysm had been observed by others.

With regard to the points raised by Sir David Ferrier and Sir Felix Semon, it struck him at once that the question as to whether the tabetic lesions were peripheral or central in origin in no way controverted Semon's law, though it was a matter of great interest. There were cases in which there was an association of abductor paralysis of one vocal cord with the corresponding side of the palate, due perhaps to the fact that the levator palati was innervated by the nucleus ambiguus; also cases in which the vocal cord abductor paralysis had been associated with a lesion of the hypoglossal nucleus; and he thought these pointed to a central origin. There were also cases of persistent pulse frequency occurring in the subjects of tabes who showed abductor paralysis. He did not think those cases were very rare, and hence in the first edition of his book he said one might almost lay down as a dictum that "*in the absence of febrile disturbance or other obvious cause (such as exophthalmic goitre), persistent increase of pulse frequency associated with laryngeal abductor paralysis or paresis points to bulbar nuclear* *degenerative lesions.*" The explanation was that it was due to associated degeneration of vago-cardiac inhibitory nuclei in association with degeneration of the nucleus ambiguus.[1]

Mr. E. D. Davis said he had shown three cases with the hope of extracting information from members. He asked whether there was any definite post-mortem evidence that apical pleurisy and tuberculosis were causes of right recurrent laryngeal palsy. In the large majority of cases of tuberculosis with adhesions at the apex of the lung, right recurrent palsy did not occur. He, therefore, did some post-mortem work at Charing Cross Hospital. In the first two cases there were enlarged glands in the mediastinum: One was a case of a child aged 12 months, in which there was no lesion of the larynx, and no paralysis had been observed; but the enlarged glands had pushed the vagus forward, and so pulled upon the recurrent nerve. The nerve was nowhere in relation to the pleura or the mediastinal pleura. In the second case the gland enlargement was due to sepsis, and here again the vagus was pushed forward, and pulled on the recurrent laryngeal nerve. One would think such a condition would more frequently cause right recurrent nerve palsy than was the case. In the next two cases there were extensive adhesions at the apex of the lung from advanced tuberculosis, but the right recurrent nerve was not involved. In another case there was mitral stenosis with dilatation of the auricle and considerable mediastinitis, and here again the left recurrent nerve was not implicated. He had shown a case of mitral stenosis, and when the case was first seen an extract appeared in the *Lancet* of August 12, 1911, showing that Dr. Fetterolf and Dr. Norris, of Philadelphia, had carried out a number of dissections in hardened subjects to show the relation of the left auricle to the arch of the aorta. The conclusions they arrived at were that the dilated auricle might press the left pulmonary artery against the recurrent laryngeal nerve and the aorta, and so produce neuritis and paralysis of that nerve. That seemed a feasible explanation. But the authors added that other causes of left recurrent laryngeal palsy should be excluded, such as mediastinitis. In the case he had shown, it looked very much like dilatation of the left auricle, but mediastinitis could not be excluded.

---

[1] This case of aneurysm he had mentioned died of bursting of the aneurysm shortly afterwards.

Mr. T. GUTHRIE remarked that Dr. Permewan referred to the fact that almost all the cases of recurrent paralysis which recovered belonged to the neuritic group. In some of those cases it was very difficult to be certain that there had been such neuritis; at any rate there seemed to be no cause of neuritis in the patient. He wished to refer to four cases, one of which was a patient of his own, one he saw with Dr. Middlemass Hunt, and the other two were seen by Dr. Hunt, who had kindly allowed him to refer to them. In all, recovery ensued in from three to eight months. They were men ranging in age from 25 to 43. The paralysis was sudden in onset, and complete from the first. In two the larynx was in other respects normal, apart from the paralysis; while in the others there was complete paralysis of one cord, accompanied by paresis of the internal tensor of the opposite cord. One of the latter cases was that of a clergyman who, the previous day, had been preaching in the open air. There was congestion of both cords. In three cases it was the left and in one the right nerve that was affected. In all cases the recovery was gradual, but complete. The first of the four patients was seen twelve years ago, and the last only last year. Two of the patients attributed the sudden hoarseness to over-use of the voice; the third to strain of neck muscles; while the fourth could suggest no cause. In this latter case the history was that the patient left home in the morning with a normal voice, bicycled a short distance to the station, and on arriving there was voiceless, in which condition he remained a fortnight. Mr. Guthrie saw him a fortnight after the occurrence, by which time the voice had begun to return. There was then complete left recurrent paralysis, with marked paresis of the right internal tensor. Possibly in this case the paralysis affected both nerves originally, but the right only slightly, and by the time he was seen the right had largely recovered. In none of the cases could the cause of the paralysis be discovered. He did not think any of the patients could be called rheumatic; nor was there evidence of toxic trouble. It would be interesting to know how many of the seventy-two cases which had been mentioned recovered. He hoped some members would be able to suggest a cause in cases where the ætiology was obscure.

Dr. JOBSON HORNE: The valuable tables which two of the introducers of the discussion have placed in our hands cannot fail to impress anyone, who may still stand in need of being impressed, with the multiplicity of diseases which may give rise to paralysis of a recurrent laryngeal nerve, and also with the importance of the laryngoscope as an aid to the recognition of obscure disease. From these tables can be deduced the frequency of any one cause relatively to all causes of paralysis of a recurrent laryngeal nerve. From the standpoint of the practitioner, however, the determination of the relative frequency of unilateral paralysis of the recurrent laryngeal nerve as an outward and visible sign of any one disease, or of a phase of any one disease, would be of greater value. Such statistical tables at present are not available owing to the neglect, as has already been pointed out, of laryngoscopic examinations by physicians and surgeons generally in the absence of symptoms pointing to a laryngeal lesion.

Some years ago, for the purpose of ascertaining the earliest changes in the larynx in pulmonary tuberculosis, I made a routine practice of examining and recording the condition of the larynx in all cases with symptoms suggestive of the possibility of thoracic disease. In 359 consecutive cases of pulmonary tuberculosis, in which the larynx was examined, unilateral paralysis of the recurrent laryngeal nerve was met with in seven cases. In five of these cases the right cord was paralysed, and in four out of the five physical signs of pulmonary disease were found in the right apex. In the other two cases the left cord was paralysed, and in both there were physical signs of disease at the apex of the left lung.

Although aneurysm of the aortic arch is the most common cause of paralysis of the recurrent nerve, nevertheless one ought to be cautious before basing a diagnosis of aneurysm upon symptoms of the disease coupled with this physical sign alone. I can call to mind such a case occurring in the pre-Röntgen days. There was marked paralysis of the left recurrent laryngeal nerve and symptoms strongly suggestive of aortic aneurysm, but other physical signs were absent. It was noticed that the thyroid cartilage was displaced to the right, and it was subsequently established that the laryngeal condition had been occasioned by an attempt at strangulation in quite early life. The fact that aortic aneurysm cannot always be discovered by means of the X-rays further emphasizes the importance of a routine laryngoscopic examination of obscure cases of thoracic disease. In a case of angina pectoris some time under my observation, dilatation of the aortic arch suddenly and acutely developed: the first sign of the aneurysm was sudden loss of voice and paralysis of the left recurrent laryngeal nerve.

Sir StClair Thomson desired to associate himself with the President's expression of satisfaction at the choice of the subject for the discussion. He had suffered a good deal from this subject himself. Those who simply took the subject from the text-books might not be aware what it meant to try and wade through the literature of the subject in an effort to clear up what still remained a very abstruse problem. He had tried to read half of what Grossmann said about Semon, and very nearly all of what Semon said about Grossmann! He (the speaker) once struggled to write a chapter on this matter for his text-book, and sent it to Sir Felix to ask his opinion thereon. The reply he got was that the subject had been completely mixed up, and was still chaotic. He felt so grateful for such candour that he wrote it all over again, and he succeeded in making it clear to himself at all events. One could not separate the clinical ætiology from the pathology of the subject; as that could not be done, the discussion that afternoon had not been as valuable as it might have been. Still, there was an improvement since the days of Avellis, when 50 per cent. of these cases were undiagnosed, and this improvement was largely due to the introduction of X-rays and the recognition of paralysis in chronic bulbar lesions. Toxic causes had also been recognized ever since influenza had been so much with us. The association with cardiac enlargement was still open to discussion. There would still be a large number of cases undiagnosed when the laryngologist was asked to help the physician, who brought a case and was told there was recurrent nerve paralysis, and that he must examine the patient's chest and neck, and interrogate his nervous system. An example was Dr. Hill's case shown just before the meeting. He (the speaker) had a similar case in a young man who when he first appeared at the Golden Square Hospital was aged 16, and he was followed up until his twenty-seventh year. He had persistent complete paralysis of one vocal cord. Since those days the Wassermann reaction and a greater disbelief in humanity had shown what a number of syphilitic cases there were about. With regard to clinical ætiology, the table of Avellis referred to cases occurring "after operation for goitre," whereas in the table prepared by Dr. Permewan they were put down as "injuries during operations on thyroid gland." No doubt there was traumatism of the recurrent laryngeal nerve in some cases, but it was only due to surgeons to point out that some of the cases were really "after operation," and not a consequence of direct injury during the operation. Where the nerve was afterwards found to be paralysed, the patient looked aggrieved and the surgeon was obviously disappointed, and yet it might have been no fault of the operator. Those cases were not examined with the laryngoscope soon after the operation, as they should be. He knew some cases in which the cords were freely moving a week after the operation, and later became paralysed. He found that this occurred in cases in which the neck wound did not heal by primary intention; they were cases in which the surgeon was compelled to put in a drainage-tube, or in which a stitch abscess formed.

Dr. DUNDAS GRANT said he had listened with great interest to what had been contributed in this discussion, and he wished to take part in order to direct attention to one of the toxic forms of recurrent nerve paralysis. A number of years ago he recorded two cases in which he thought any one who read his reasons would agree that they were instances of alcoholic neuritis of the left recurrent laryngeal nerve. He took great care to exclude other causes in attributing the cause to alcohol, especially as these were exceptions to the general rule that toxic paralyses were bilateral. Dr. Permewan recently asked him about cases, and he told him of these two, but Dr. Permewan was unable to find them. This was due to a misprint in the Table of Contents in the *Journal of Laryngology* for that year. The cases are described in vol. xii, p. 540, as follows:—

> *Case I.*—The first case is that of a clergyman, aged 40, who consulted me on account of weakness of his voice which came on suddenly at the commencement of a service. The condition persisted, and it had become necessary for him to find a remedy or to resign his position. I found complete immobility of the left vocal cord, both in respiration and phonation in the cadaveric position. There were some very limited movements of the cartilage of Santorini, but the thorax appeared to be absolutely normal, and it was impossible to elicit any evidence of previous specific infection in spite of the absolute candour of the patient. In inquiring further into his previous ailments I elicited the fact that he had recently suffered from sciatica on the left side, from which he had not yet completely recovered. He was still subject to paroxysms of pain, and there was a considerable degree of anæsthesia of the skin of the affected limb. It seemed to me more than probable that the so-called sciatica was a neuritis, and that the paralysis of the vocal cord depended upon an identical condition affecting the left recurrent laryngeal nerve. It only remained, then, to discover some cause sufficient to account for the production of these neurotic conditions. There were no signs of locomotor ataxy; and I thought of toxic neuritis. There was no indication of lead, mercury, or arsenic; and it was, therefore, necessary to approach the question of alcohol. There was complete absence of appetite in the morning, and the patient had frequently suffered from disturbances of the liver (acute gastritis); and I observed a singular negligence with regard to his dress, and even the general care of his person, which was quite out of harmony with his professional and social position—in fact, I suspected a tendency to the abuse of alcoholic stimulants. The patient admitted, in fact, that he drank

at least a pint of strong stout at each meal, and that in addition he spent the evening up to a late hour in reading and drinking brandy and water. He had not the slightest idea that his excess in alcohol had given rise to his symptoms; but he allowed himself to be convinced, and undertook to make the sacrifice necessary for his recovery—namely, complete abstinence from alcohol. He obtained, at the same time, a short period of rest from his professional duties, during which he took fairly large doses of tincture of nux vomica. After a rest of some weeks he returned to his duties, and found his voice as strong and reliable as before his illness. I was able to assure myself, by laryngoscopy, that the movements of the vocal cord had again become normal. When last seen the voice was excellent, the larynx natural in every respect, and the sciatic symptoms had disappeared. The patient had lost his morning anorexia, he had certainly improved in his general condition and was able to fulfil his duties without the least difficulty.

Case II.—A lady, of middle age, consulted me on account of an obstinate cough, which fatigued her both during the day and prevented her from sleeping at night. Beyond a slight bronchial catarrh I found nothing except a well-marked paralysis of the left vocal cord. During the examination of the chest I observed the cicatrix resulting from the amputation of the right breast, which had been carried out several years before on account of a tumour suspected of being cancerous. Under these circumstances I feared the development of a carcinomatous condition in the mediastinal glands, but beyond the paralysis of the left recurrent nerve there was no other sign of it. There was further no indication of syphilis or tuberculosis. I then elicited that the patient complained of well-marked nausea and loss of appetite in the morning, and that she was subject to bilious attacks. I recommended the greatest discretion in the use of alcohol and wrote to her family medical attendant, communicating to him my suspicion that there was a tendency to excess in alcohol, and asking him whether he had any reason to share it. He replied that such an idea had not occurred to him, and that he could hardly believe that the lady, who was well known and respected, could be thus affected. Two weeks later she returned, stating that the morning nausea had considerably diminished, but that she was still troubled with a cough. Her general condition had improved, but the vocal cord was still completely paralysed. The husband, who accompanied her, made the spontaneous inquiry as to whether the use of brandy would be injurious to his wife, because she had acquired the habit of taking frequent doses of it, on account of certain cardiac attacks, and that she "poured the spirit into a large glass without measuring it." This confirmation of my suspicion allowed me to speak openly, and I insisted that the daily allowance of stimulants should be limited to two glasses of Marsala. After another fortnight I saw the patient once more. The general condition had greatly improved; the husband assured me that the cough had diminished both by day and by night, and I made out some distinct movements of the left cord of slight extent but quite unmistakable. On examination at the end of another ten days the movements were still more pronounced, and I ventured to assure the patient that the affection of the larynx did not depend in any way upon malignant disease.

That kind of case he regarded as quite rare; he had not had other similar cases in his own practice. Alcoholic neuritis was generally bilateral, and the abductors were usually affected, so that the symptoms had generally been those of interference with respiration, whereas in Dr. Grant's cases there was hoarseness. He had shown to-day a microscopical specimen from the case he brought forward at the March meeting[1] showing giant cells, in confirmation of the idea that it was due to a tuberculous lesion situated near the apex of the petrous bone. It would be remembered that the case was that of a young man who had facial paralysis and acoustic paralysis, with paralysis of the right vocal cord, right half of palate, and the right glosso-pharyngeal. He took the man into Brompton Hospital. He had headache also. Under rest he recovered somewhat from that, but began to get some difficulty in moving his legs. Was there extension of the disease to the pyramidal tracts? He did not think that could occur without involvement of the hypoglossal, which was quite intact. Therefore he operated in the mastoid region, and found considerable tuberculous rarefaction of the petrous bone, and during scraping of the roof of the antrum there was a flow of pus from the interior of the cranium. Free opening of the cranium revealed a fungating growth, evidently tuberculous, on the surface of the dura mater, the size of half-a-crown, which confirmed the provisional diagnosis made when the patient was shown at the March meeting.

---

[1] *Proceedings*, p. 118.

To-day Dr. Grant had brought a case which resembled paralysis of the left recurrent nerve. There was some fixation of the left vocal cord in abduction, but there was sufficient infiltration of the ary-epiglottic fold and ulceration of the inner side of the arytænoid cartilage to account for the fixation in that position. But the question was as to the possibility of recurrent paralysis, and Dr. Melville, who was present now, had made a beautiful skiagram. From Dr. Melville's description there was evidently considerable fibrosis and evidence of thickening in the mediastinum, which compressed the œsophagus, and might very probably involve the recurrent laryngeal nerve. But in view of the local condition the exhibitor thought there was enough to account for the fixation of the cord in the position mentioned.

The alcoholic cases he mentioned earlier recovered.

The PRESIDENT (Mr. Herbert Tilley) announced that Dr. Logan Turner had sent from Edinburgh an analysis of 100 cases of either unilateral or bilateral paresis of the recurrent laryngeal nerve. In that series the cause of the paralysis was known in fifty-nine cases, and unknown in forty-one.

He (the President) felt greatly interested in the opening papers, as well as in the clinical experiences of Mr. Guthrie and Sir StClair Thomson. During the past five years in his private practice he had seen many cases of paralysis of the recurrent nerves. In some the cause was easy to determine—e.g., aneurysm, mediastinal growth, malignant disease of the gullet, &c., but in others the causative factor was indeterminable, and he had during the past three days been enabled to re-examine four of such cases with results which were interesting. The following is a brief summary of them :—

Case I.—F. W., male, aged 53, seen February 19, 1910. Symptoms: Hoarseness, two months, said to have been caused by "a bad cold and a touch of influenza." Laryngeal examination: Paralysis of dilator muscles of left side, the left vocal cord being in the middle line. No abnormal physical signs in the chest nor in the central nervous system. Laryngoscopic examination, May 1, 1913: Both cords acting in normal fashion, and voice perfect.

Case II.—Captain H., aged 44, seen June 9, 1910. Symptoms: Hoarseness, one month's duration, "following a chill": "keeps wanting to cough to clear the throat." Laryngoscopic examination: Left vocal cord motionless in the middle line. No physical signs in chest, pupils equal, no sign of central nerve lesions. Laryngoscopic examination, April 30, 1913: Larynx absolutely normal. The patient says that two months later the voice returned almost suddenly while "messing" in camp.

Case III.—Mrs. O. T., aged 42. Seen February 10, 1908. Symptoms: Difficulty in singing or speaking plainly, noticed for a fortnight; otherwise no symptoms. Laryngoscopic examination: Right vocal cord motionless in the middle line. Sir John Broadbent could find no physical signs in the chest, and beyond a few slightly enlarged cervical glands on each side of the neck there were no lesions in the neighbourhood of the larynx or trachea. Laryngoscopic examination, May 2, 1913: The larynx is normal, and both vocal cords move equally well on phonation and deep inspiration.

Case IV.—J. P., aged 62, male, seen May 26, 1910. Hoarseness, two months' duration. Laryngoscopic examination: Left vocal cord motionless in the middle line. This was confirmed by two other laryngologists. Sir Douglas Powell could find no evidence of any intrathoracic lesion, and skiagrams of the chest taken in Freiburg-im-Breisgau gave similar negative results. Laryngoscopic examination, Monday, April 28, 1913: The left vocal cord remains in the position of adduction. The voice is perfect, the patient's general health excellent, and he plays golf twice a week.

He added that he had been brought up to regard paralysis of a vocal cord in an adult as a matter for a grave prognosis, but in the light of his own experience, and of such cases as had been recorded by the aforementioned speakers, he felt that recurrent paralysis should always suggest grave possibilities rather than probabilities.

Dr. DE HAVILLAND HALL, in reply, said he would like to relate a case which Sir Felix Semon saw ten years ago. The patient came to see him (Dr. Hall) for life assurance. He had abductor paralysis of the left vocal cord, hence Dr. Hall could not recommend him for life assurance. He had to go to South Africa for business, and he came back a year later and insured himself, as he was well. Therefore, this unnecessary caution which had been observed caused a considerable loss of business to this young man. In answer to Mr. E. D. Davis as to the post-mortem appearances in cases of recurrent paralysis due to disease of the apex of the lung, or pleuritic thickening, there was only one case he could speak of, and that was not one observed by himself, and he had forgotten whether the evidence was clinical or post mortem. The neurological questions raised by Sir Felix Semon he would leave to Sir David Ferrier to answer; he had refrained from dealing with the neurological side.

Sir DAVID FERRIER, in reply, said he wished he was able to answer all the questions which Sir Felix Semon had put to him, but he did not think this was possible in the present state of our knowledge. It was certain, however, that the extensor muscles were first involved where a peripheral mixed motor nerve was the seat of neuritis. Why this was so, he could not say. Whether it depended on functional or reciprocal relationship, or the relative trophic strength in the nerve-centres, the same thing happened to the posterior crico-arytænoid in case of neuritis or pressure on the recurrent laryngeal nerve. No one that he knew had ever questioned the accuracy of the Semon-Rosenbach law. The point he wished to make in regard to tabes was that in the majority of instances there were clear indications of peripheral lesion. The cases in which central lesion had been described were vague, and the clinical symptomatology apparently so inconsistent, that he attached little importance to them. He thought the whole subject required re-investigation by modern methods. As to whether, in bulbar paralysis, the abductors were affected before the adductors would require examination at an earlier date than was, perhaps, usual; for, as was well known, the abductors might be paralysed before the voice was appreciably affected. He maintained, however, that on a due consideration of all the facts, tabetic laryngeal paralysis, in which the abductors only were paralysed, was most probably due to peripheral causes.

The rapidity of the pulse, so often seen in tabes, to which Dr. Watson-Williams had alluded, was no doubt due to implication of the inhibitory nerve of the heart, which arises from the same nucleus as the recurrent laryngeal. It might, of course, be due to central lesion, but, on the other hand, it might be accounted for by peripheral lesion, just as the recurrent laryngeal paralysis itself.

Dr. PERMEWAN, in reply, said he had been much interested in the cases described by the President and by Mr. Guthrie, but he thought it would be dangerous if members had the impression that there were a very considerable proportion of cases of abductor paralysis which was simply due to a functional or neuritic cause and were, therefore, recovered from. He feared it was likely that Dr. Watson-Williams's experience would be repeated, and that patients would often develop symptoms sooner or later of organic disease.

Laryngological Section.

June 6, 1913.

Mr. HERBERT TILLEY, President of the Section, in the Chair.

Case illustrating the kindly Effect of Time in obliterating the Scars of Extensive Incisions for Operation on the Frontal Sinus.

By HERBERT TILLEY, F.R.C.S.

MRS. F., aged 60, was operated on by me thirteen years ago for chronic empyema of both frontal sinuses. The usual incision through each eyebrow was made—a vertical incision in the lower half of the mid-frontal region,—and these were joined by transverse incisions across the root of the nose, which joined the lower end of median with the inner end of the latter incisions. It was thus possible to turn upwards and outwards on each side a triangular flap which fully exposed the anterior wall of each frontal sinus. The nasal cavities are free from suppuration and the internal surface of one sphenoidal sinus is easily seen.

Adult Male with (?) Early Malignant Disease of Lower Pharynx and Upper End of Gullet.

By HERBERT TILLEY, F.R.C.S.

R. T., AGED 53, complained of difficulty in swallowing solids and loss of flesh, but no pain on swallowing. He says he had a large lump on the left side of the neck which "had been dispersed."

Laryngoscopic examination reveals a small raised, flat swelling with free edges behind and just above the left arytænoid. Its surface is slightly paler than the surrounding mucosa and is not ulcerated. Examination by the direct method reveals a distinct ulceration on the left side of the hypopharynx, and apparently in direct continuity with the growth seen in the laryngoscope. One ulcer bled readily from the mere passage of the tube, which entered the gullet without any difficulty. There is a small, hard, easily movable gland behind the upper end of the left sternomastoid. Further, in the left base of the tongue is a smooth, circumscribed, slightly raised nodule about the size of an ordinary filbert. The movement of the tongue is quite free and probably this growth has nothing to do with that in the lower pharynx.

The case was seen hurriedly, and the patient is taking iodide of potash and mercury.

[Since the above notes were written I have made a careful examination of the patient by the direct and indirect methods. There is *no* growth in the hypopharynx, but the growth on the postero-lateral pharyngeal wall bleeds freely on being touched, and it is probable that it was the hæmorrhage from this which led me to think that there was ulceration in the hypopharynx.]

DISCUSSION.

The PRESIDENT (Mr. Herbert Tilley) said he would be glad to hear opinions as to the nature of this case. If one passed the direct tube into the upper end of the gullet, there was distinct ulceration which bled freely. The patient could swallow only liquid food. A hard gland could be felt behind the upper third of the left sternomastoid.

Mr. HARMER said he thought it would turn out to be malignant. He asked whether pieces of growth had been removed from the upper part of the œsophagus and from the tongue; also whether glands had been removed from the neck, because possibly the patient had more than one malignant growth, and, if so, cure by operation was hardly possible.

Dr. W. HILL said operation would have to be a formidable one, because the larynx and base of the tongue would also have to be removed. Mr. Evans once showed at the Section a case in which he did a very extensive removal, including about one-third of the œsophagus, glands, the base of the tongue, pharynx, and larynx. The patient not only recovered, but afterwards married. Food was conducted from a hole in the side of the pharynx by a rubber tube down to a gastrostomy opening.

The PRESIDENT replied that he only saw the patient for a few moments at the Radium Institute last week, but he asked him to come to this meeting. He was admitted to hospital on the previous day and would have his blood examined (Wassermann test), and probably a portion of the ulcer would be removed before any radical operation, which had not yet been definitely decided on.

Symmetrical Swellings on Anterior Aspect of Arytænoids just above the Vocal Processes.

By HERBERT TILLEY, F.R.C.S.

H. C., MALE, aged 30, complained that his throat gets dry after using his voice for a few minutes. No other symptoms.

On the anterior and median aspect of each arytænoid and above the level of the vocal process a small, pale, raised prominence can be seen. These come into contact on phonation, but do not interfere with the free movement of the arytænoids and the voice is not affected. The patient has had syphilis and been treated for the disease, but without any effect on the above appearances, which may be of the nature of pachydermia. Possibly the symptoms have nothing to do with the laryngeal appearances.

DISCUSSION.

The PRESIDENT asked for any views on the pathology of the case. He had an open mind on the subject, but suggested it was pachydermia. The patient complained of thirst, but there was no sugar in the urine, and no kidney disease was present.

Dr. H. J. DAVIS said the condition at first sight suggested papillomata, but on careful inspection the growths were found to be hard; on the left side was a cup-shaped depression into which the elevation on the opposite side fitted. He believed it to be pachydermia, and advised leaving it alone.

Sir STCLAIR THOMSON agreed with the diagnosis of syphilitic pachydermia. He was once deceived by a case somewhat similar, which turned out to be tubercle, but in it there was some abrasion or ulceration of one of the swellings. If he were the patient he would not have them operated on, but a scientific enthusiast might wish to remove a portion and examine it under the microscope.

Dr. JOBSON HORNE also considered that the excrescences might be of the nature of pachydermia laryngis and that syphilis was a causative factor. He would be in favour of reducing the excrescences and of insisting upon absolute silence during treatment. The man's occupation permitted of this. The throat symptoms complained of could be accounted for by the nasal obstruction of which he complained, and attention to the latter would doubtless be beneficial both to the throat and to the larynx.

Dr. DONELAN said that viewed externally, in the absence of a speculum, the appearance of the nose suggested a deviated septum. The patient said that one of the reasons his throat was so dry was that he had much difficulty in breathing through his nose. Dr. Donelan would be glad to know how far this might be correct.

The PRESIDENT replied that the question of nasal obstruction was gone into, and it was concluded that there was not enough to indicate that it was a probable factor in the laryngeal condition.

Case of Osteoma of the Nose in a Woman, aged 31.

By H. LAMBERT LACK, F.R.C.S.

SHOWN at the Laryngological Society in 1904.[1] She had a large growth in the left nostril, completely distending it, pressing the septum over to the right side, and occluding the ostium of the left antrum. The growth was removed by curetting and she has remained well until the last three months or so. Now there are signs of a return of the growth in the position of the left inferior turbinate and on the outer wall of the nose above the turbinate. During the last three months she has had some neuralgia on the left side of the face and some swelling of the left cheek. The left antrum is completely dark on transillumination. There is no discharge from the nose. The case is shown as being an exceedingly rare one and any suggestions for treatment would be welcome.

DISCUSSION.

Dr. JOBSON HORNE said the Section had been fortunate in having had brought before it similar cases during the last few years. The pathology, so far as he knew, had not been worked out, and the cases had not been classified. In the present case, although the growth was mainly on the left, the right side was also involved. The disease, according to his own observations, was usually bilateral. Speaking generally he thought the lesions were due to an infective process.

[1] *Proc. Laryng. Soc. Lond.*, 1903-4, xi, p. 112.

Dr. KELSON said that some years ago he showed a case resembling the present one, and they seemed to be allied in some respects to cases which occurred on the West Coast of Africa. The bone must have been quite soft, as Dr. Lack spoke of removing it with a curette. In his own case, though the bone appeared to be hard, it crumpled up when touched with a sharp instrument. The section showed simply thin bone, and there appeared to be no growth. He considered Dr. Lack's case to be of the same nature. Several somewhat similar cases had been shown in the last few years.

Dr. BOND did not consider there was anything wrong on the right side, but on the left there was considerable thickening about the canine fossa, and a large mass in the nose. The history seemed to point to a growth beginning on the inner wall of the antrum, and if the antrum were opened up, either by cutting alongside the nose and through the upper lip, or lifting up the nose and cheek, one could see what should be done. He thought it would be necessary to make a cut to the internal angle of the orbit. Possibly the whole upper jaw would have to be removed.

Mr. E. D. DAVIS asked whether Dr. Horne and Dr. Kelson referred to the condition of hyperostosis cranii. There had been eight of those cases shown in which there was enlargement of other bones, including the maxilla, the nasal processes, both sides of the nose, the temporal bone, mastoid, and exostosis of the ear. Dr. Lack's case appeared to be localized to the nose, and was not hyperostosis cranii.

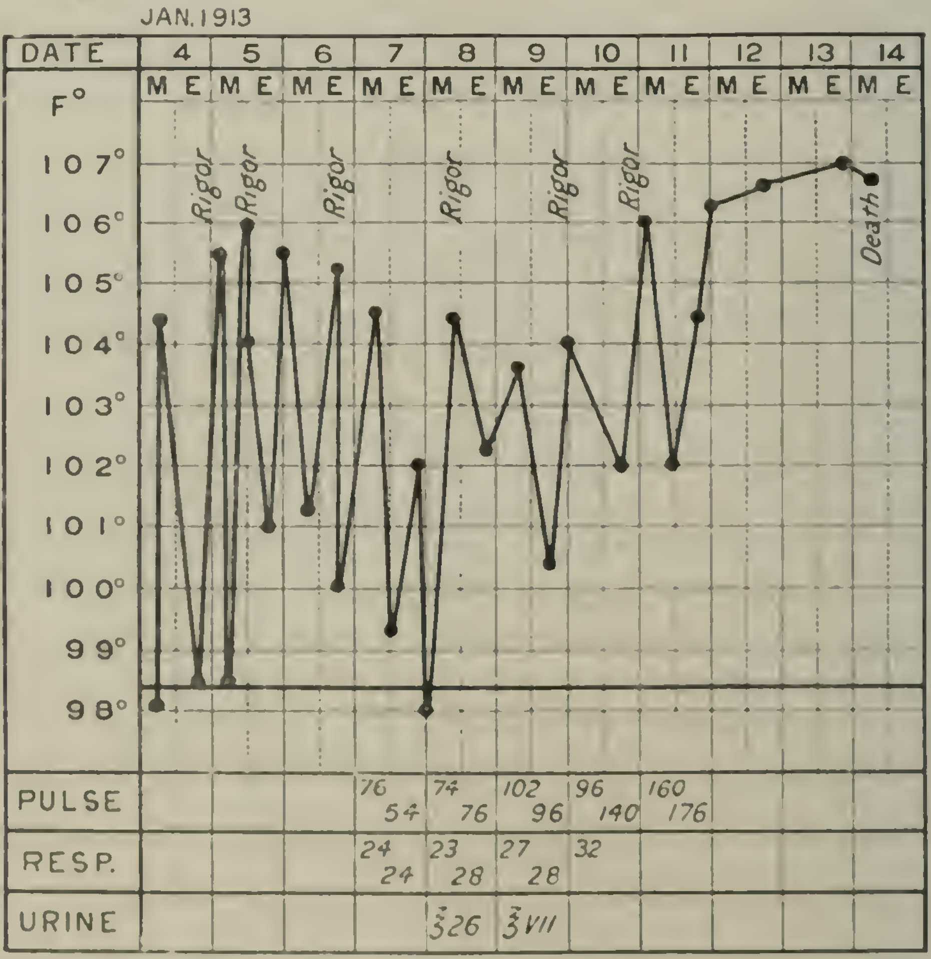
Sir STCLAIR THOMSON said he only wanted to discuss the case from the standpoint of operation. It had been suggested that the upper jaw should be removed, but if a radical operation were contemplated, why remove the upper jaw? It would mean removal of the alveolar border, and result in disfigurement, and it did not bring the operator very near the site of disease. He asked that Moure's operation (lateral rhinotomy) should be considered. He had introduced it to one or two general surgeons, one of whom, Mr. Burghard, said he did not think he would ever again remove the upper jaw. By entering below the eye and cutting through the ascending process of the superior maxilla, there was free access to the antrum, nose and sphenoid, without disfigurement of the patient. It also preserved the teeth, and there was not much bleeding caused.

Dr. LACK, in reply, said his idea was to turn up the upper lip and reach the outer wall of the nose in that way, as it was the lower part of the nose which was affected.

Chart and Brief Notes of a Case of Cavernous Sinus Thrombosis following Left Tonsillitis in a Boy, aged 10; Fatal Termination in Eighteen Days.

By H. J. Davis, M.B.

The chart is exhibited showing oscillations of temperature varying from 98° to 106° F. The highest point reached was 107° before death, when the pulse-rate was 176; on the fourteenth day of illness only 7 oz. of urine were passed.



Temperature chart of case of cavernous sinus thrombosis.

This case, a private one, I saw in consultation with Dr. Simpson and Dr. Watson, of Tunbridge Wells, on the evening of January 9; the boy had been ill for fourteen days, and he died four days later. Extracts from the notes of the case as kindly given to me by Dr.

Simpson, who first attended the child on January 1, are briefly as follows:—

The patient, a fine, healthy boy aged 10, who was home for his Christmas holidays, developed on December 27 a unilateral parenchymatous tonsillitis. His two brothers had previously been laid up in the same house with follicular tonsillitis. This had run its usual course.

On January 3 the temperature was 104° F., with rigors, and these continued in spite of all treatment until he died on January 13, the temperature being 107° F.

January 5: Antistreptococcus serum was injected by Dr. Watson, and the next day he again incised the palate and tonsil, and on January 7 incision was made in the neck, but no pus was found.

January 8: Swab taken from the wound, and blood taken from elbow vein; swab was sterile, but after prolonged cultivation *Staphylococcus albus* was found in the blood.

I saw the child on January 9, and the diagnosis of cavernous sinus thrombosis was obvious. The eyelids were œdematous and tightly closed over the eye, which was bulging, there was ecchymosis of the conjunctiva, and œdema had spread to the forehead and face from blocking of the facial vein, and extended down the neck. There was little to be seen in the throat except that the left tonsil was red and slightly enlarged. Incisions were made in the palate, face, neck and eyelids, and the conjunctiva was also incised and 5 minims of liq. ammoniat. fort. administered every two hours in water. Oxygen, saline infusions and strychnine injections also administered.

January 10: Twitchings and paresis of the leg supervened; lumbar puncture fluid clear; 4 c.c. drawn off, apparently not under pressure. Fluid sterile and did not reduce Fehling's solution.

Child died on January 13.

With reference to the administration of strong ammonia, which it is known reduces the liability to thrombosis, Dr. Simpson says: "It is possible it prevented the spread of thrombosis across the circular sinus to the right cavernous sinus, since symptoms of affection of the latter appeared, but did not progress."

In the only other two cases of cavernous sinus thrombosis following tonsillitis which I have seen, in one the patient recovered but was blind, and the other, a soldier, died on the fifth day. In each case the affection was unilateral.

At a meeting of the Otological Section on November 18, 1910,[1]

---

[1] *Proceedings*, 1911, iv (Otol. Sect.), pp. 27 and 28.

I reported a case of double cavernous sinus thrombosis. The patient was a woman, aged 36, with intracranial suppuration following mastoid disease. She died on the fifth day after operation.

DISCUSSION.

Mr. O'Malley asked what suggestion Dr. Davis had to make as to the route of spread of the infection from the tonsil to the cavernous sinus. He knew of a case in which the cavernous sinus became involved three weeks after the removal of tonsils and adenoids. The patient died and the post-mortem examination showed the tonsillar and adenoid regions fully healed, and the presence of an osteo-myelitis of the body of the sphenoid, which involved the sinus by direct spread along the optic nerve on one side. In the present case there might have been another focus of infection besides the tonsil, which would account for rigors and high temperature, even before invasion of the sinus.

Sir StClair Thomson said he had seen only three cases of thrombosis of the cavernous sinus. In two the spread was from the sphenoid, and the third was an ear case. He agreed with Mr. O'Malley that it was difficult to trace the route from the tonsil. The histories seemed to suggest that the same infection which attacked the tonsil got located in the sphenoidal sinus, and that even in so-called tonsil cases the thrombosis was really of sphenoidal origin.

Dr. Jobson Horne recalled a case in which there was no external indication of infection, but post mortem the sphenoidal sinus was found to be infected, and that fully explained the condition.

Dr. W. Hill asked what line of surgical treatment should be adopted in cases of cavernous sinus disease if one were asked to do something more when vaccines failed. The sinus was awkwardly situated, but it could be got at either through the skull or through the orbit or through the sphenoidal sinus. He wondered whether it had been found useful to turn out the clot and drain. Had anyone found that frequent doses of ammonia were of definite use?

Dr. FitzGerald Powell said that he had had a case of cavernous sinus thrombosis following *intercranial suppuration.* The petrous portion of the temporal bone was found extensively necrosed, and the superior petrosal sinus was also thrombosed. Thromboses of the pterygoid plexus of veins were usually responsible for cavernous sinus thrombosis in infection from throat. He believed the sinus had in some cases been approached through the pterygo-maxillary fossa.

Dr. Dan McKenzie said Dr. Hill's point would be found dealt with in a recent number of the *Lancet*[1] in an article by Mr. Ballance, being a paper read by him at the International Congress of Otology, Boston, last year

---

[1] *Lancet*, 1912, ii, pp. 1001-5.

Dr. H. J. DAVIS replied that the severity and the circumstances of the case made a great impression on him. The boy had what was called "an ordinary sore throat" with a small ulcer on the left side. He saw the child nine days after he became ill. He believed the infection of the cavernous sinus travelled through the facial vein, as it communicated by the angular vein with the ophthalmic vein in the orbit. The œdema of the face was due to plugging of the facial vein. He did not know whether there was trouble in the sphenoidal sinus, but there was nothing to suggest it. Strong ammonia certainly reduced the liability of the infection to spread: that was seen also in jugular sinus thrombosis in which the jugular was not tied, and in femoral thrombosis and thrombosis elsewhere in the body. It lessened the tendency to coagulation.

Mr. WHALE said that the route was tonsil, pterygoid plexus, facial and angular veins; and then via the ophthalmic vein as had just been suggested.

Unilateral Paralysis of Left Cord, Tongue and Palate, in a Man, aged 49. ? Cause.

By H. J. DAVIS, M.B.

THE patient, a healthy-looking man, had a history of three weeks' increasing difficulty in swallowing, and the case was supposed to be one of early œsophageal growth. It will be seen that the left side of the tongue is atrophied and paralysed; the same applies to the palate and the same to the left side of the larynx. The dysphagia is probably, therefore, due to muscular weakness. The patient attributes his trouble to a heavy blow on the left side of the head. Dr. Grainger Stewart, who has examined the patient, thinks it is not a case of syringomyelia, but that the implication of the cranial nerves is due to a meningitis, probably specific. The patient is not very easy to examine.

DISCUSSION.

The PRESIDENT remarked that similar cases had been shown before. Some years ago he had shown two cases: (1) A patient suffering from syringomyelia in which there was paralysis of the right vocal cord, of the right half of palate and pharynx, the right sternomastoid and upper third of trapezius. (2) A male, with paralysis of left vocal cord, left sternomastoid and upper third of trapezius. This was probably due to a basal pachymeningitis. Similar cases had been previously recorded by Hughlings Jackson and Morell Mackenzie.

Dr. H. J. DAVIS, in reply, said that a Wassermann test was found to be faintly positive: he had just received the report.

Perforating Ulcer of the Palate in a Man, aged 63.

By W. H. Kelson, M.D.

Patient (a clerk), who denies syphilis, says he first noticed a small sore on the roof of his mouth eighteen months ago. Six months ago he went into hospital and had three doses of neo-salvarsan, 2·4 grm. in all, and on leaving the Wassermann test was negative. He then gave up treatment for some months. The ulceration, however, still went on, and he became much troubled with food passing up into his nose. He then became a patient at the London Throat Hospital, and is now taking perchloride of mercury and iodide of potassium. A large funnel-shaped ulcer of the hard palate is present, which passes up into the cavity of the nose.

DISCUSSION.

The President said that two or three years ago there was a somewhat similar case at University Hospital. The man was medically treated with antisyphilitic remedies, as well as calomel inhalations. The Wassermann test, however, was always negative; and yet the appearance was so much like that of syphilis, that the treatment mentioned was continued. The patient died, and the disease was proved to have been chronic glanders. In this case the whole soft palate was eaten away so that one looked up into a dome in the nasopharynx. Dr. Kelson's patient said he had had a good deal to do with horses, but not with any which were suffering from glanders.

Dr. Jobson Horne said the localized nature of the growth and its duration were against it being glanders, as suggested by a previous speaker. The appearance of the ulceration was unusual in that situation and reminded one of so-called "rodent ulcer." However, the enlarged and hard lymphatic gland beneath the angle of the jaw on the right side suggested malignancy.

Dr. Kelson replied that he would follow up the President's suggestion. Dr. Graham Little suggested to him that a portion of it should be removed for examination, as he thought it might be malignant or tubercular.

Lupus of the Gums and Pharynx in a Man, aged 40.

By W. H. Kelson, M.D.

Patient, who denies syphilis, states that his throat first felt sore about seven months ago, but says he now has no pain on swallowing. On examination ulceration and a nodular condition is seen on the gums, right tonsils, palate and pharyngeal wall. Marked improvement has taken place since he has been put on arsenic, and incidentally a very irritating skin eruption from which he had suffered for several years has disappeared.

DISCUSSION.

The President noted that the gums were most diseased where the pyorrhœa was most marked. The teeth certainly needed attention.

Dr. Jobson Horne had detected a similar lesion in the inter-arytænoid region of the larynx of the patient.

Dr. Kelson replied that there had been much improvement since the patient had been taking arsenic. He could now swallow in comfort, whereas previously he had been in considerable pain. He believed it was lupus.

Case of Laryngeal Disease presenting Atypical Features.

By W. Jobson Horne, M.D.

The patient, a kitchen porter, aged 36, two years ago was under treatment for neurasthenia. Fifteen months since he underwent a nasal operation for the relief of tinnitus aurium. When he came under the exhibitor's notice he sought relief for post-nasal discharge and sore throat, and stated that he had been losing weight (four to eight stone in six to eight months).

The left vocal cord was hidden by the left ventricular band. The movement of the cords had been irregular, the left appeared to move with a greater effort than the right cord. The question for discussion was the nature of the laryngeal lesion.

A sister had died from consumption. The examination of the thorax and the sputum was negative. A Wassermann test had not been done at the time of writing this note.

DISCUSSION.

Sir STCLAIR THOMSON said he looked carefully for the atypical feature, but he could not see it. He saw one ventricular band more prominent and slightly overlapping one vocal cord, but he did not regard that as more than a physiological abnormality.

The PRESIDENT said that the day before he was consulted about a similar case. The patient had been speaking in public a good deal, and his physician saw the left ventricular band rather overlapping the corresponding cord. He (the speaker), gave the opinion that the appearances were within normal physiological limits.

Dr. W. HILL suggested that there was probably present a condition of hyperplasia of the lining membrane of the ventricle, although there was not as yet a projection from the ventricle.

Dr. KELSON suggested it might be slight laryngitis, such as one would expect to see in a man who suffered from post-nasal discharge.

Dr. JOBSON HORNE, in reply, regretted that he had not received the report on the Wassermann test. He certainly did not consider that the appearances which the larynx presented should be passed over as being within the normal physiological limits. The laryngeal appearances fluctuated from time to time, and he would report further on the case.

Case of Double Paralysis of the Superior Laryngeal Nerves in a Man, aged 25, in the Course of Disseminated Sclerosis from Lead Poisoning.

By JAMES DONELAN, M.B.

THIS man was first seen as an out-patient in the throat department of the Italian Hospital on June 19, 1912. He gave a history of pleurisy at the end of the previous October, since when he had been losing weight and presented a thin, sallow appearance. He had a husky voice and a small, white, lenticular swelling about 3 mm. diameter at the juncture of the right vocal cord and vocal process. He had some soft râles over both upper lobes. The case was regarded as probably one of tuberculosis and was entered in the case-book as laryngeal tuberculosis with a query. At the request of his relatives an effort was made to get him into a sanatorium and he went to one on September 14, remaining there until November 9, when it was decided that the case was not one of tuberculosis. The patient went to the London Hospital on January 8, where he was seen by Dr. Head, who regarded the case at that time as showing distinct signs of disseminated sclerosis.

Dr. Lambert Lack, who examined him about this time, found there was no laryngeal abnormality. He remained under treatment at the London Hospital until March 5, when, finding his voice getting very much worse, he returned to the Italian Hospital. It was then found that both crico-thyroid muscles were paralysed, but there was no paralysis of the recurrents. Abduction and adduction are unimpaired and the patient possesses a loud, rough voice, being able to shout, but the tone and ring of the normal voice are absent. He is a fairly easy subject to examine and the wavy outline of the glottis is very characteristic. There appears to be some slackness of the arytæno-epiglottidean folds. There is scarcely any movement of the cricoid cartilage towards the thyroid during phonation.

The patient's appearance was, and continues to be, greatly improved by his sojourn at the sanatorium. He has been continuously treated with strychnia and iodide of potassium since March without any change in his general or local symptoms.

When this man first came to the Italian Hospital he was described as a porter, and in the few minutes during which he was examined no allusion was made to the exact nature of his employment that would have suggested further inquiries. It now appears that he was a printer's labourer, occasionally employed on small jobs of type-setting, such as the titles of books. He had also a good deal to do with the handling, cleaning, and forwarding of frames of type already set to other works of the large firm by whom he was employed. He was a perfectly healthy man when he entered the employment of this firm four years ago and continued to be so until the attack of pleurisy in 1911, which seemed to have diminished his previous resistance to lead-poisoning.

Tonsil Forceps for holding the Tonsil during Excision or Enucleation.

By JAMES DONELAN, M.B.

THIS instrument is on the principle of the Krause wool-holder and permits the passage of any snare or tonsillotome after the grasp has been secured. It is made to grasp the tonsil in a vertical direction as suggested by Ballenger some years ago. Instead of teeth, which are so often apt to tear the tonsil, it has two grooved rings like a tongue forceps. It has proved very useful in the removal of stumps and embedded tonsils.

Sinusitis Exulcerans of the Frontal Sinus; Operative Trauma of the Dura; Recovery.

By Dan McKenzie, M.D.

There are two points of interest in this case; first, the injury to the dura and (?) the frontal lobe of the brain, and secondly, the protracted course of the case.

The patient, a female, aged 66, was sent in August, 1912, to the Central London Throat and Ear Hospital from the Western Ophthalmic Hospital, whither she had gone on account of a small, painless swelling under the left supra-orbital margin of a few days' duration. There was no history of any discharge from the nose, and when I came to examine her no pus could be seen in any part of the nasal cavities. Nevertheless, the swelling, which had now spread to involve the whole supra-orbital region and upper eyelid, was obviously due to frontal sinus suppuration, and the patient was admitted for operation.

Following the classical rule, the first operation was to have been limited to simple opening and drainage of the sinus. But early in the proceedings the dura was wounded in a curious manner. After making the first incision through the eyebrow down to the periosteum, whereby a quantity of pus was evacuated, I proceeded to elevate the pericranium over the site of the sinus from off the anterior surface of the frontal bone by slipping an elevator under the pericranium so as to lever up that structure off the bone. But the bone was like wet pasteboard, and, in the act of levering the end of the elevator plunged through the anterior wall of the sinus, and—as subsequent examination showed—through a sinus full of pus, through its posterior wall, which was thin but healthy, and through the dura!

Continuing the operation, I found that all the walls of the sinus (save the posterior) had undergone or were undergoing disintegration—the "bridge" and intersinus septum included. I therefore had to clear away all these parts, and, after this was done, the fractured posterior wall lay exposed to view. This wall I also removed with cutting bone-forceps and revealed a tear in the dura about 3 mm. in length. The dural tear was then enlarged until the cerebrospinal fluid began to flow freely. Finally, a gauze drain was inserted between the lips of the dural wound, and the sinus, &c., was lightly packed with iodoform gauze.

Save for a violent headache next day, the patient showed no sign of intracranial damage, and fears of trouble from the accident soon subsided. The frontal sinus wound, however, continued to discharge, so that about six weeks later the Killian operation, necessarily modified by the previous extensive destruction of bone, was undertaken. It was found necessary to fashion an artificial infundibulum as there seemed to be no indication of the presence of that duct, and a drainage tube was inserted to maintain the channel into the nose, the skin wound being entirely closed. But this attempt failed. So violent was the local reaction induced by the tube that we had to remove it, and, in consequence, nasal drainage came to a standstill and the external skin-wound opened up again. (This operation showed the dural and intersinus septal openings soundly healed.)

The sinus wound went on discharging pus for several months longer, and then a third operation was performed. On this occasion softened bone in the direction of the external angular process was removed. This operation also failed to stop the discharge. And it was not until the fourth operation (February 3, 1913), when I discovered a long, fine "gallery" running back in the orbital roof almost to the optic foramen and removed its floor, that the sinus began to heal. At this operation a second attempt to constitute an infundibulum was made, because it was obvious that if the sinus had to heal up independently of nasal drainage it would be impossible to close the skin wound and deformity would result. But this attempt failed like the others, because the tube could not be tolerated. The sinus is now entirely obliterated and, we hope, finally healed. The deformity is great, but so was the bony destruction. In any case, I do not propose to perform any plastic operation.

Attention is drawn again to the accident to the dura (and doubtless to the brain) and to the advisability of exposing and enlarging such wounds so as to institute a free flow of cerebrospinal fluid.

DISCUSSION.

Dr. McKENZIE added that the patient had no recollection of what happened on the day of the operation; and in cases of head injury he had noticed it as a frequent circumstance attending concussion of the brain that the patient did not remember what had taken place during the several hours previous to the accident. He wondered, therefore, whether the injury in this case had sufficed to obliterate all memory from the brain relating to the events of that day.

The PRESIDENT said that on Whit Sunday he was called to the University College Hospital to see a similar case, in which there was an acute exacerbation of chronic frontal sinus empyema. He made the usual incision through the eyebrow, and inserted an elevator to raise the periosteum from the front wall of the sinus, but the bone composing that wall was so soft and infiltrated by inflammatory products that it broke away with the periosteum and thus the sinus cavity was at once exposed in its whole anterior extent. The patient had made an uninterrupted recovery. The posterior wall of the sinus was healthy.

Dr. H. J. DAVIS said he did not see the object of always removing the floor of the sinus. The best way of making an infundibulum larger was with a drill, and he did not think such a cavity ever closed up. It left a hole large enough for the house surgeon to pass in a catheter and wash it out. Patients got well without the floor of the sinus being removed, and there was less risk of injury to the eye.

Major MOORE said the patient had made an excellent recovery from her very serious illness. It would seem a pity that so large a degree of deformity should remain. Did Dr. McKenzie at a later date propose, by paraffin injection or other means, to lessen this?

Dr. MCKENZIE replied that the patient was aged 66, and she had come through a serious illness. But if she were to express her desire to get married he would do his best to improve her appearance. As she did not contemplate that step at present, he would leave her alone, as he had a dread of that particular frontal sinus. The Killian operation was done, and the infundibulum made. The moment the skin was put back, there being no bridge to support it, it collapsed back on the gutter, and nothing which could be subsequently done enabled an opening to be made right down into the nose. He removed the floor of the gallery because he hoped the contents of the orbit would come up and obliterate the gallery. That was, he believed, what occurred. He applied to the little gallery the same treatment that Killian applied to the frontal sinus itself in his radical operation.

Death after Tonsillotomy.

By DAN MCKENZIE, M.D.

THE patient, a boy, aged 9, was brought to the Central London Throat and Ear Hospital on March 6, 1913, for the removal of enlarged tonsils and adenoids. The presence of sub-acute and middle-ear catarrh, with some fever (temperature 101° F.), led to the postponement of the operation on the throat for five weeks. At the end of that time he was considered to be sufficiently well. Tonsils and adenoids were, therefore, removed in the out-patient department under ethyl chloride anæsthesia on April 16, 1913, the simple tonsillotomy operation being performed.

Three days after operation he returned to hospital with a temperature of 103° F.; great œdema and swelling of the left side of the neck below the left angle of the jaw, together with redness, swelling, and a sloughy condition of the left side of the palate and pharynx. His facies was ominously septic. An incision was at once made under chloroform into the œdematous cervical swelling, and a great quantity of fœtid pus delivered by Hilton's method from the deeper structural planes of the neck.

Next day the boy looked better. The cervical œdema had disappeared, the faucial inflammation had subsided, and the patient could phonate, swallow and breathe without difficulty. The temperature was lower, oscillating between 99·2° and 102° F. On the following morning, however, he was suddenly seized with violent pain in the left side of the chest, the respirations rose to 30 in the minute, friction could be heard, and his strength began to fail. Eighteen hours later he died.

Post-mortem: Double pneumonia and pleurisy, with double empyema; pericarditis and pericardial effusion. The organisms obtained both from the cervical abscess and from the pleural cavity were of the same type as those which normally inhabit the mouth and pharynx—*Spirochæta dentium*, &c. The patient's teeth were all sound.

The exhibitor has operated on rather more than 3,000 cases of tonsils and adenoids. Of these three have died, including the above case: one from the anæsthetic (nitrous oxide), and two from sepsis. In both of the septic cases the infection seemed to have originated in the mouth. I make it a rule to precede this operation with the use for some days of a 1 per cent. solution of lysoform as a mouth-wash and gargle.

It is noteworthy and perhaps significant that in the case just recorded this precaution was accidentally omitted.

DISCUSSION.

The PRESIDENT said the Section would feel grateful to Dr. McKenzie for recording the case, because one often heard a parent remark. "The operation is nothing, is it?" Members of the Section knew the operation was not without risks, and that there were many evil possibilities, which, fortunately, did not often happen.

Dr. JOBSON HORNE, referring to the bacteriological findings, "*Spirochæta dentium*, &c.," as given in the notes of the case, considered that the presence of the *Spirochæta dentium* was a coincidence and not the cause of the death. The latter he considered was contained in the "etcetera," and was probably a pneumococcus infection and associated with the middle-ear disease. The use, or the omission of the use for some days previous to the operation, of a 1 per cent. solution of lysoform as a mouth-wash and gargle would in no way have affected the result of the operation.

Dr. DONELAN congratulated Dr. McKenzie on having brought the case forward. He hardly thought, however, that death should be attributed directly to the effects of tonsillotomy. It was more probably due to an intercurrent pneumococcal infection. It would doubtless be remembered that the pneumococcus was much the prevailing organism throughout the months of April and May. Its virulence in this case may have been intensified by symbiosis with the *Spirochæta dentium.*

Dr. H. J. DAVIS said that two years ago an out-patient, aged 7, died eight days after such an operation, of septic pneumonia, and with enlarged glands on each side of the neck. It was not unusual for out-patient operation cases to be laid up with bronchitis, and the condition of the throat became septic if they did not receive careful subsequent attention at home. His practice was to order them to be kept three days in bed and another three days indoors. He did not think the omission of the lysoform had anything to do with the fatal result in Dr. McKenzie's case.

Dr. MCKENZIE replied that he was prepared to stand by his contention that the *Spirochæta dentium* was the probable cause of the death. Still, that reference was purposely made vague in the report, as he could not be absolutely sure. The omission of the lysoform, and the presence of the organisms in the neck and in the thorax, all hung together in a chain, and pointed to the mouth organisms as the cause of death. This Section was a clinical, not a pathological one, and so it could do no more than suggest that a certain organism was the cause. But such suggestions might stimulate pathological research. He joined issue with Dr. Donelan when he remarked that it might be intercurrent pneumonia, because he (the speaker) contended that a septic pneumonia which occurred within a week of the operation was due to the operation, and should be so recorded, both for their own sakes and for the sake of the public.

Goitre with Severe Pressure Symptoms. ? Malignant.

By Dan McKenzie, M.D.

The patient is a woman, aged 73. The goitre has appeared within the last three years. It is nodular and rather hard. There is tracheal stridor and some difficulty in swallowing. The left cord is paralysed; the trachea can be seen to be narrowed; the external jugular vein is greatly enlarged; and there are some enlarged glands in the left supra-clavicular region.

DISCUSSION.

Mr. Harmer did not think the evidence was clear that it was malignant disease. The difficulty of breathing and swallowing might be caused by the fact that it travelled down into the thorax behind the sternum, and if she were well enough he would take out a piece of the growth and ascertain its nature. If not malignant, she should be given the opportunity of thorough removal of the left half of the gland.

The President said he had seen a patient who had paralysis of the left recurrent nerve, with difficulty in swallowing; the case was transferred to Mr. Berry, who operated upon her, and removed a large dermoid cyst from behind the manubrium sterni. In the patient shown to-day the thyroid was rather soft, whereas the malignant tumours of this gland which he had seen had usually been extremely hard.

Dr. McKenzie replied that he thought it was malignant because it was a small goitre, and yet there was not only dyspnœa, but also dysphagia, paralysis of the recurrent laryngeal and blockage of the internal jugular vein. But there was some support for the other view, and he would do as Mr. Harmer recommended. Two years ago he had a case of what appeared to be a thyroid, which was pulsating, and hæmorrhage was expected; but it turned out to be a mediastinal dermoid presenting in the neck. It did not permit of removal, and a sinus was left open in the neck, discharging dermoid material.

Endothelioma of the Soft Palate in a Girl, aged 17.

By Dan McKenzie, M.D.

The growth appeared in the nasopharynx in clusters of polypoid-looking masses. Three operations have been performed. In the last a fortnight ago the external carotid was tied, and the soft palate removed. But it was found impossible to remove the whole of the growth as it had extended to involve the lateral wall of the nasopharynx.

DISCUSSION.

The President said he had seen seven such cases, and he hoped he would never see another; they were amongst the most disappointing and sometimes tragic cases one could meet with. He had seen them early, when there was only a little deafness or a little anaesthesia over the lower division of the fifth, and a little immobility of the levator palati. Mr. Trotter had done extensive and very complete operations on some of his cases, but he feared that no case had been cured. Convalescence was long and very trying and early recurrence usual.[1]

Dr. H. J. Davis said Mr. Harmer's treatment by diathermy might be used here. He had sent a case to St. Bartholomew's Hospital for that treatment, after Mr. Harmer had exhibited his cases last year.

Mr. Harmer said ten cases of malignant growth of the palate had been treated at St. Bartholomew's Hospital by diathermy. One was still well, eighteen months afterwards, and had been exhibited. There was not much difficulty in the operation, and not much soreness afterwards. He was doubtful if the present case could be cured.

Dr. W. Hill said Mr. Trotter had recorded several of these cases. He had seen two bad cases in which the tumour temporarily disappeared when treated with radium. In a case referred to him by Mr. Martineau the tumour was so large that the palate was pushed forward nearly to the teeth, and the patient could neither hear, swallow nor breathe. Five tubes totalling 250 mg. were used for about forty hours, and the whole soft mass disappeared, though the invasion of the bone in the region of the pterygoid process remained, as evidenced by ulceration and some pain. Hearing became normal in one ear, and greatly improved in the other, swallowing became normal, and the patient was able to dispense with his tracheotomy tube at the end of a week. The patient lived six months, but there was eventually marked involvement of the maxilla, &c. Mr. Graham had an identical case in which after one similar application of radium the whole growth disappeared, and there was no recurrence a year after.

---

[1] Since the above meeting I have seen another advanced case in consultation and large doses of radium are to be tried.—H. T.

Mr. KISCH suggested that Coley's fluid might be tried in this case, starting with a very small dose, and working up.

Dr. MCKENZIE replied that he did not think any of the remedies suggested would make much difference in this case, because when he tied the external carotid, he had removed some glands which were found to contain growth. The patient came complaining simply of nasal obstruction, and he saw what looked like polypi in the nasopharynx. On putting his finger in, he found they sprang from the upper surface of the soft palate. The pathologist reported at first that they were simple nasal polypi, but further investigation revealed their true nature.

A Specimen of a large Polyp growing from the Tonsil.

By E. D. DAVIS, F.R.C.S.

THE patient, a man, aged 21, said that he could see something growing from his tonsil, but there were no symptoms. The pedicle of the polyp was crushed with artery forceps and the polyp cut off. A sketch of the condition before removal of the polyp, the specimen, and a microscopic section were shown.

DISCUSSION.

The PRESIDENT said Mr. Arthur Cheatle had shown a similar case in which the growth hung out like a polypus from one of the crypts in the tonsil. They nearly always grew from the region of the intratonsillar fossa.

Mr. E. D. DAVIS replied that the section showed epithelium covering the polyp, and there was fibrous tissue, and fat, as well as adenoid tissue.

An Unusual Condition of the Nasopharynx.

By J. H. Connolly, F.R.C.S.

Patient, a woman, aged 32, under the care of Mr. Sydney Scott at St. Bartholomew's Hospital for suppurative otitis media believed to have begun about three years ago. No complaint directly referable to nasopharynx now.

Description: Passing upwards and backwards from Eustachian cushion on either side and meeting across vault of nasopharynx is a fringe of mucous membrane, which might be compared to the peripheral remains of a diaphragm. It presents two small perforations, one on either side. There is a distinct interval between posterior edge of septum nasi and the fringe.

DISCUSSION.

Dr. Jobson Horne said that when the condition was unilateral the question of traumatism had been raised.

Dr. McKenzie said it looked like scar tissue.

Dr. H. J. Davis considered it was scar tissue from a gumma in the post-nasal space.

Mr. Connolly expressed the opinion that the structure was congenital in origin.

Malignant Disease of the Œsophagus; Complete Paralysis of the Left Recurrent Nerve.

By E. A. Peters, M.D.

H. W. F., aged 43, carpenter, suffered with a severe attack of influenza eight weeks ago. Twenty days ago the voice suddenly lost strength and became hoarse. For eight days there has been inability to swallow solid food. The left cord is completely paralysed; it is curved and lies in the cadaveric position. The left arytænoid is slightly pushed forward and rotated, so that the vocal process is prominent and gives the sickle-shaped appearance to the cord. A bougie passes only 8½ in. from the teeth and an enlarged gland can be felt above the left clavicle. Nothing abnormal was found on examining the heart and lungs.

DISCUSSION.

Dr. W. Hill said he had seen a number of malignant cases in which the dysphagia was of quite sudden onset. The revealing signs of cancer of the œsophagus were very late. Sometimes even with considerable stricture the patient could swallow well, and in most instances the disease was quite advanced before anything was suspected of being wrong, especially when the disease was too low to cause laryngeal paralysis. His diagnosis of advanced malignant stricture based on endoscopy had often been received with scepticism in cases where patients were brought for the relief of a sudden impaction of a large portion of meat or vegetable in the gullet where there had been no previous symptoms whatever of dysphagia.

The President mentioned a case in which the dysphagia seemed determined by a hearty laugh, and next day the patient was found to be unable to swallow solid food. Until this symptom arose he did not think he was in anything but perfect health.

Case of Ulcer of the Pharynx.

By H. A. Kisch, F.R.C.S.

Patient has had a sore throat for two months. The glands in the neck have been enlarged about the same time, but both sides are said to have been involved at first. The throat has been treated by her doctor with antiseptic gargles, and gets better at times, but has never become quite well. A small elongated ulcer is seen on the lateral wall of the pharynx, on the left side just behind the posterior pillar of the fauces. The base and edges are firm to the touch, but not everted or indurated. There is a chain of glands in the left posterior triangle, the upper glands being the larger, and they appear to be inflammatory in nature. A portion of the posterior edge of the ulcer has been removed for examination and the report has just been received from Dr. Bernstein that the section of the wall of the ulcer simply shows an inflammatory condition.

The patient is aged 24, has had two children and no miscarriages.

Note.—The Wassermann reaction was positive. The ulcer is healing and the glands diminishing in size with antisyphilitic treatment.

Recent Laryngeal Perichondritis with Stenosis.

By William Hill, M.D.

Dr. Hill said the man was first shown as a case of escharotic stricture of the deep pharynx and gullet after swallowing glacial acetic acid; later as a laryngeal case with impaired abduction, probably due to myopathic injury, and now he showed it as laryngeal stenosis, obviously associated with perichondritis. The latter had come a month ago. Intubation of the gullet had been discontinued for a considerable time previously. The patient was now wearing a tracheotomy tube and taking iodide of potassium. If he were treated by intubation probably an abscess would form. There had not been more than a slight nocturnal elevation of temperature, for a few days at the most, and he did not suspect it as being streptococcal, but it might be latent chronic pneumococcal disease. There were no tubercle bacilli or any other pathogenic organisms found in the discharges, and the Wassermann reaction was negative. As there was evidence of much external thickening of cartilages as well as internal stenosis it was possible that an abscess might appear later and clear up the diagnosis. He was quite unable to explain the sequence of events.

Brain with large Pituitary Tumour in situ.

By William Hill, M.D.

The case was described at the March meeting of the Section.[1] The specimen was now shown mounted in gelatine, which prevented detachment of the tumour from the brain in handling the glass jar. Dr. Spilsbury had slightly tinted the gelatine pink to endeavour to overcome the yellow colour which the gelatine assumes in course of time, and which tends to diminish the natural coloration of the specimen secured by the Kaiserling process.

A slice has been removed from the surface of the right half of the tumour to show extravasation of blood into the substance of the tumour from operative perforation. This led to the formation of a large hæmatoma beneath the capsule and caused death by increased intracranial pressure.

---

[1] See *Proceedings*, p. 103 *et seq.*

The PRESIDENT reminded members that uncontrollable hæmorrhage occurred, and the consequent intracranial pressure proved to be the undoing of the patient. The flattening of the convolutions showed how severe the pressure had been.

Tumour of Superior Maxilla.

By WALTER HOWARTH, F.R.C.S.

THE patient has noticed a swelling of the right side of the face for six months. There has been no discharge from the nose and only bleeding on one occasion three weeks ago. There is no pain. There is no pus in the antrum. On transillumination there is a dark shadow on the right side, whilst the X-ray plate shows the region to be more opaque than the left side. There are no unerupted teeth.

An exploratory incision was made in the labio-gingival fold and the periosteum raised over the swelling. The surface of the tumour was smooth and gradually shaded off into the maxilla, so that it was impossible to say which was tumour and which maxilla. Considerable portions were chiselled away and presented the appearance of rapidly growing bone. Microscopic sections show a condition of chronic osteitis with considerable rarefaction.

Ulceration of Hard Palate on Right Side and Mass under the Tongue on Left Side.

By W. M. MOLLISON, M.C.

J. C., AGED 71, attended the Out-patient Department at Guy's Hospital, on the advice of Dr. Heald. History: He has noticed a small lump under the left side of the tongue for some twelve months; it has slowly increased in size and is painless, though bleeding now and then. He has noticed pain in the left parotid and submaxillary regions during eating. There is a hard, movable mass under the tongue on the left side, scarcely painful to touch; not ulcerated. The tongue can be protruded quite well. There is superficial ulceration on the right side of the hard palate extending on to the posterior extremity of the alveolus; the palate is freely movable. There is a single hard gland beneath the angle of the jaw on the right side.

DISCUSSION.

Dr. HILL did not consider the palate lesion was quite of the nature of ulceration; it was rather a very granular hyperplasia, in fact almost a lupoid condition of palate. The tongue condition, on the other hand, was highly suggestive of malignant disease. It was desirable to know the after-history of such a case.

The PRESIDENT said he particularly wanted to know what was the nature of the lesion on the hard palate: he had been treating a similar case for eighteen months with antisyphilitic remedies, arsenic, galvano-puncture, and application of chromic acid. The latter seemed to do much good, but just when success seemed to be attained the ulceration broke out again.

Dr. H. J. DAVIS said epithelioma of the palate often began in this way. One instance was shown at the Section three and a half years ago. Some thought it was herpes and others that it was lupus. He first thought it was lupus, and then tuberculosis, but the patient, a postman, developed later a fungating mass which was malignant. He was shown by him at the Otological Section last October.

The PRESIDENT said Mr. Charters Symonds had drawn attention to the point mentioned by Dr. H. J. Davis, and he (Mr. Tilley) showed, at the Laryngological Society of London, a case which looked like a localized suppurative folliculitis. Mr. Symonds thought this would turn out to be epithelioma, and proved to be correct. The President asked that the case might be reported later.

Dr. KELSON said he was struck by the resemblance of the case to Dr. Lack's, sections of which proved to be papilloma. He suspected the present case was malignant, but possibly it might be papilloma.

Mr. MOLLISON said in reference to the last speaker's remarks that he recently saw a man with a very superficial ulcer on his soft palate, creeping into the right tonsillar fossa. There was a strong tubercular history—almost all his relatives had died from it. The ulcer was superficial and movable; there were no physical signs of phthisis; Wassermann's test was negative. He removed the growth locally, thinking it was a localized tuberculous ulcer; section, however, showed it to be epithelioma. With regard to his case, he replied that he took the ulceration on the palate to be syphilitic, and thought the mass under the tongue was a chronic inflammatory condition becoming epitheliomatous. He would have a picture made of the case and report the result of the operative findings.

PROCEEDINGS

OF THE

ROYAL SOCIETY OF MEDICINE

VOLUME THE SIXTH

COMPRISING THE REPORT OF THE PROCEEDINGS FOR THE
SESSION 1912-13

MEDICAL SECTION

LONDON
LONGMANS, GREEN & CO., PATERNOSTER ROW
1913

Medical Section.

OFFICERS FOR THE SESSION 1912-13.

President—

Frederick Taylor, M.D.

Vice-Presidents—

Sir J. Kingston Fowler, K.C.V.O., M.D.
Seymour J. Sharkey, M.D.

Hon. Secretaries—

Robert Hutchison, M.D.
H. Batty Shaw, M.D.

Other Members of Council—

Sir John F. H. Broadbent, Bt., M.D.
J. Walter Carr, M.D.
J. Michell Clarke, M.D.
Archibald E. Garrod, M.D., F.R.S.
A. M. Gossage, M.D.
William Hunter, M.D.
Percy Kidd, M.D.
Hector W. G. Mackenzie, M.D.
Cyril Ogle, M.D.
A. F. Voelcker, M.D.

Representative on Library Committee—

Archibald E. Garrod, M.D., F.R.S.

Representative on Editorial Committee—

Robert Hutchison, M.D.

MEDICAL SECTION.

CONTENTS.

October 22, 1912.

PAGE

Aneurysm of the Aorta which ruptured into the Right Auricle, giving rise to Recurrent Pleural Effusion, with some Remarks on Aneurysms of the Aorta communicating with Adjacent Vessels. By Sir JOHN F. H. BROADBENT, Bt., M.D. 1

November 26, 1912.

A Fatal Case of Widespread Ulceration limited to the Small Intestine. By SYDNEY PHILLIPS, M.D. 11

Four Cases of Auricular Tachycardia. By C. EDGAR LEA, M.D. 14

January 28, 1913.

Some Observations upon the Results of Four Years' Work at King Edward VII Sanatorium. By NOEL DEAN BARDSWELL, M.D. 31

The Occurrence of Acute Pneumonia during Treatment with Arsenic. By F. PARKES WEBER, M.D. 51

February 25, 1913.

Some Cases of Polycythæmia. By GORDON R. WARD, M.B. 55

The Prognostic Significance of Secondary Polycythæmia in Cardio-pulmonary Cases. By F. PARKES WEBER, M.D. 83

April 22, 1913.

Gout and Chronic Rheumatism: Their Ætiology from the Bacteriological Standpoint, and some Notes on Treatment. By H. Lyon Smith, M.D. ... 99

Treatment of Ambulant Cases of Pulmonary Phthisis by T.R. and B.E. in the Out-patient Room. By T. D. Lister, M.D. 111

May 27, 1913.

Cases of Chyliform Effusion. By H. A. Lediard, M.D. 123

Chylous and Pseudo-chylous Ascites. By R. L. Mackenzie Wallis 136

The Council think it right to state that the Society does not hold itself in any way responsible for the statements made or the views put forward in the various papers.

John Bale, Sons & Danielsson, Ltd., 83-91, Great Titchfield Street, London, W.

Medical Section.

October 22, 1912.

Dr. FREDERICK TAYLOR, President of the Section, in the Chair.

A Case of Aneurysm of the Aorta which ruptured into the Right Auricle, giving rise to Recurrent Pleural Effusion, with some Remarks on Aneurysms of the Aorta communicating with adjacent Vessels.

By Sir JOHN F. H. BROADBENT, Bt., M.D.

A CONSIDERABLE number of cases of rupture of aortic aneurysm into the superior vena cava or the pulmonary artery have been recorded, but rupture into the right auricle is rarely met with, and the case I am about to describe presents features of unusual interest, in that the onset of symptoms followed directly on a serious accident, that the patient survived some four months, and that recurrent effusion into the right pleural cavity was a prominent symptom.

DESCRIPTION OF THE CASE.

Wm. B., aged 40, was admitted under me to St. Mary's Hospital on March 3, 1910. He was a well-built man, a shunter by occupation, and the history was that he had been perfectly well till twelve weeks before admission, when he was caught between the buffers of two railway trucks and severely crushed. No bones were broken, but he suffered from severe dyspnœa and shock. He was put to bed, where he remained till admission to the hospital. During this time dropsy of the lower extremities developed and he was very short of breath and incapable of any exertion.

On admission there was œdema of the lower extremities and of the scrotum. The face was pale, also the lips; there was no cyanosis or œdema of the face. There were subconjunctival hæmorrhages in both eyes. Temperature 97° F.; respiration 24; pulse 100. The pulse was regular in force and frequency, the vessel somewhat thickened, and the pulse wall was large and forcible, collapsing rapidly—a pulse typical of aortic regurgitation. On examining the heart the apex beat was not visible or palpable. The area of cardiac dullness extended 1 in. beyond the right margin of the sternum, and ½ in. to the left of the vertical nipple line. There was no bulging or pulsation in the second intercostal spaces on either side of the sternum. On auscultation a blowing systolic and diastolic murmur was audible in the fifth left space just outside the vertical nipple line. A loud blowing diastolic murmur was audible over the aortic area, conducted down the left border of the sternum, and most intense at the level of the third left costal cartilage. A blowing systolic murmur was also audible at the aortic cartilage and over the whole præcardial area. It was not vibratory and did not vary in intensity. Lungs: The note over the right front was somewhat high pitched over the upper half. Below and in the axilla there was dullness, with diminished vocal resonance and fremitus up to the anterior axillary fold and behind up to the angle of the scapula. The abdomen was distended and the abdominal walls and scrotum were œdematous. The liver was enlarged but not pulsating, and its edge was felt 3 in. below the costal margin. Urine: Specific gravity 1030; there was a thick deposit of urates on standing; no sugar or albumin present.

FURTHER HISTORY OF THE CASE.

On March 5 the patient had a severe attack of dyspnœa. The right pleural cavity was aspirated and 28 oz. of clear fluid were drawn off. On March 9, as the legs were very œdematous, Southey's tubes were inserted into the legs and 4 pints of fluid drained away. On March 10 severe dyspnœa recurred, and 3¾ pints of fluid were withdrawn from the right pleural cavity. This seemed to fill up with fluid almost as fast as it was withdrawn. On March 21, 3½ pints were withdrawn; on March 25, 4 pints; on March 27, 5 pints; on March 30, 2 pints;

on March 31, 3½ pints; on April 1, 3½ pints; on April 3, 4 pints; on April 5, 2 pints; on April 7, 2¾ pints; on April 10, 1½ pints; on April 12, 3 pints; making a total of 42½ pints which were withdrawn from the right pleural cavity in a little over a month. These repeated aspirations were necessary to relieve the severe dyspnœa.

The condition of the heart remained much the same, but the pulse increased in frequency to 120 and became gradually weaker. On April 6 vomiting set in, which persisted till April 11. On April 12 he had an attack of acute mania, shouting and struggling violently, after which he got rapidly worse, dying on the following day.

POST-MORTEM EXAMINATION.

The pericardium contained about 6 oz. of clear fluid. Both pleural cavities contained a large amount of clear fluid. The lungs were œdematous and partially collapsed. There were no adhesions. The liver was greatly enlarged and showed extreme congestion and an advanced "nutmeg" condition.

The Heart and Great Vessels.—The right auricle was enormously dilated and admitted a closed fist. The right ventricle was also greatly dilated. The tricuspid orifice was very much dilated and the hand could be passed through it into the ventricle. The pulmonary valves were normal. The left auricle and ventricle were slightly dilated. The mitral orifice admitted four finger-tips. The mitral and aortic valves were normal. Immediately above the attached border of the left cusp of the tricuspid valve a portion of the endocardial lining of the right auricle was seen to project into the cavity of the auricle. In the centre of this bulging portion of endocardium was a small linear tear about ½ in. long, which opened externally into the aorta.

The Aorta.—Behind the right posterior cusp of the aorta was a small saccular dilatation immediately above the valve, which opened into the cavity of the right auricle through the slit in the endocardial lining as described above. The aneurysmal sac was about the size of a cowrie shell, and its walls were very thin. The orifice in the sac which communicated with the interior of the right auricle was very small, about ⅓ in. at its widest part. It appeared that the orifice of the sac might be completely occluded during the systole of the heart by the floating up of the cusp of the aortic valve which lay immediately below it, but would be freely open during diastole where the aortic valves were closed. The aortic valves were normal and were not thickened. There was no general dilatation of the aorta or sign of aneurysm elsewhere than the small sac described above. There were a few patches of atheroma, but there was no extensive disease of the walls of the aorta.

REMARKS.

The presence of the diastolic murmur and the history of the onset of the symptoms after a buffer accident seemed to point to the diagnosis of traumatic rupture of the aortic valve, giving rise to aortic incompetence. Dilatation of the left ventricle and back working through the lungs, with eventual dilatation of the right side of the heart and its complete breakdown might be expected as a sequela. This was the diagnosis made during life, but the recurrent pleural effusion of such enormous quantity seemed quite inexplicable.

The findings at the post-mortem examination were extremely interesting. The aortic valves were normal and competent, so the diastolic aortic murmur could not be attributed to aortic incompetence. One of the cusps of the aortic valve apparently acted as a valve to the leaking spot in the aneurysm which opened into the right auricle, occluding it during systole of the heart and leaving it open during diastole. Thus during diastole of the heart blood would regurgitate from the aorta, in which the pressure was high, into the right auricle, so that a diastolic murmur would be generated, and the features of aortic regurgitation would be present in the pulse.

The explanation of the recurrent pleural effusion is not quite such a simple matter, but if we picture what was happening it seems capable of explanation. During diastole blood would be flowing into the right auricle, not only from the great veins but also from the aorta under considerable pressure. This would give rise to great dilatation of the right auricle, and a greatly increased volume of blood would have to be dealt with by the right ventricle, which would also become dilated. This great volume of blood being launched into the lungs, it is conceivable that, as the right ventricle began to fail, a water-logged condition would ensue. The chief difficulty seems to lie in the fact that pleural effusion rather than a general œdema of the lungs resulted, and on this point I should very much like to hear the opinion of Fellows of the Society.

As long ago as 1868 Peacock[1] read a paper on communication of the sacs of aneurysms with cardiac cavities or adjacent vessels, and collected 43 cases. Of these aneurysms, 5 opened into the right auricle, 4 into the right ventricle, 2 into the right ventricle and pulmonary artery, 3 into the left auricle, 7 into the vena cava superior, 18 into the pulmonary artery, and 4 into branches of the pulmonary artery. It will be of interest to give brief notes of the cases he describes of rupture of aneurysm into the right auricle, for comparison with the case under discussion :—

Case I: The patient was a man, aged 35, in whom the symptoms set in after strain on lifting a heavy weight. There was dyspnœa, œdema, lividity of the face and upper part of the body. A "double bellows" murmur was audible over the sternal region. He became delirious at the last, surviving one month. At the post-mortem there was an aneurysm of the aorta projecting into the right auricle, into which it opened by two small oval apertures. The heart was large and all the cavities were dilated.

Case II: Man, aged 35. There was cough, dyspnœa, and lividity of the face, with a pulsating tumour to the right of the sternum. He survived four months. At the autopsy there was an aneurysm the size of a hen's egg, which opened just above the valves of the aorta into the right auricle by a small aperture the size of a crow quill.

Case III: Man, aged 36. He was ailing some time with cough and dyspnœa and hæmoptysis. The face was livid. A diastolic bruit was present over the whole præcardial area. At the autopsy there was an aneurysm opening into the right auricle by two small apertures the size of a pea. The cavities of the right side of the heart were greatly dilated.

Case IV: Man, aged 48. The face was sallow and puffy and there was œdema of the lower extremities. He had a sudden attack of dyspnœa and vomiting, which proved fatal in eighteen hours. There was an aneurysm the size of an egg, which opened into the right auricular appendix by two round openings the size of a bougie. The right auricle was greatly dilated.

The symptoms in these four cases are in part those of obstruction to the return of blood to the heart from the vena cava superior and in part those of pulmonary engorgement, as perhaps one might expect.

In a case of rupture of an aneurysm of the aorta into the superior vena cava which I had the opportunity of observing from start to finish the predominant features were intense dyspnœa at the outset, rapidly followed by cyanosis and brawny swelling of the face and neck. The patient was a man, aged 59, who had a sudden attack of pain in the chest and dyspnœa in the night. When seen the following day the face was intensely cyanosed and puffy, the neck presented a hard, brawny swelling almost suggesting cellulitis, and there was orthopnœa. In a week's time numerous distended veins of collateral circulation began to develop over the upper part of the front of the chest, and later on over the back above the scapulæ. No murmur or pulsation was present at the outset, and it was not till three weeks later that a soft systolic murmur was first audible in the second right intercostal space. The œdema of the face and neck subsided and the cyanosis became less pronounced, but was still quite evident. He recovered sufficiently to leave the hospital for a short time, but returned with œdema of the right arm and upper part of the chest. Some pulsation was present in the second right intercostal space and the systolic murmur was more pronounced. He got rapidly worse and became delirious, dying four months after the first onset of symptoms.

---

[1] *Trans. Path. Soc. Lond.*, 1868, xix, p. 145.

Pepper and Griffiths[1] collected twenty-five cases of rupture of aneurysm of the aorta into the superior vena cava, and the predominant symptoms in the cases which survived were cyanosis, dyspnœa, and œdema of the neck and face, indicative of obstruction of the superior vena cava.

In the case of rupture of an aneurysm into the pulmonary artery, sudden dyspnœa due to pulmonary engorgement, followed sooner or later by symptoms of right ventricle failure and general œdema, would seem to be the predominant features. A loud continuous vibratory murmur, audible over the second left intercostal space, would seem to be present in many cases which survive. These were the most important symptoms in one case which I had the opportunity of observing. Lamplough,[2] in 1897, published fifteen cases of this condition which he had collected.

As the right auricle is a kind of half-way house between the superior vena cava and the pulmonary artery, one might reasonably expect the symptoms of rupture of an aneurysm into its cavity to be a blend of

[1] *Amer. Journ. of Med. Sci.*, Philad., 1890, c, p. 329.

[2] *Brit. Med. Journ.*, 1897, ii, p. 392.

those of rupture of aneurysm into the vena cava and into the pulmonary artery, and in Peacock's four cases quoted above this would appear to be so.

In the case I have brought before you to-day the symptoms of pulmonary engorgement entirely overshadow those of venous obstruction. This may, perhaps, be due to the fact that the aperture between the aneurysm and the auricle was closed during systole of the ventricle, so that no blood entered the auricle during its diastole to obstruct the venous return, whereas as soon as the aortic valves closed blood would flow freely into the auricle and thence into the right ventricle both from the great veins and the aorta, and thus tend to cause very marked pulmonary engorgement.

DISCUSSION.

Dr. ROBERT HUTCHISON commented on the fact that there was recurrent pleural effusion on the right side, rather than œdema of the lung, and asked if the author could advance any theory as to its causation.

Dr. BATTY SHAW said he would like to hear more about the diastolic murmur, because it was a novelty to hear of a diastolic murmur which was produced through a communication between the aorta and the right auricle. Was the left ventricle found, post mortem, to be hypertrophied? It was claimed that both aortic and pulmonary regurgitation might occur with hypertrophy and dilatation of the left and right ventricles respectively, without any evidence of endocarditis, and the semilunar orifices had been found by measurement to be enlarged, as was done by the late Dr. Bryant, of Guy's Hospital, in the case of the pulmonary orifice. If the left ventricle was hypertrophied, it was presumptive evidence that the murmur was one of those which might have been due to stretching of the aortic ring, independently of anything like endocarditis: and the presence of an aneurysm in the neighbourhood would lend additional support to the idea that it might have been a stretching of the ring.

Dr. F. PARKES WEBER, discussing the pleuritic effusion, said that in spite of the history of traumatism, there was a possibility that the cause of the aneurysm was partly syphilitic. If that was the case, the syphilitic aortitis might have spread to the pleura, setting up a chronic localized syphilitic pleuritis, which (together with the condition of the venous engorgement) would be sufficient to account for the pleural effusion. A Wassermann's test might be useful in future cases of the kind, though it was doubtful whether the presence of a positive Wassermann's reaction obtained with the fluid of a pleuritic effusion could be relied on as positive evidence of the syphilitic origin of the pleuritic effusion in question, or even as positive evidence that the patient had ever had syphilis.

The PRESIDENT (Dr. Frederick Taylor) said that as Sir John Broadbent had referred to a contribution which he made on the subject, he might be allowed to dwell upon it briefly. It was a paper which he published in the *Guy's Hospital Reports*.[1] He had previously shown, at the Pathological Society,[2] a case of communication of an aneurysm with the pulmonary artery, and he collected some seven cases from the Guy's Hospital Case-books of a few years previously. To those he added cases described by Dr. Peacock and by Mr. Thurnam, of communications of aneurysm with different cavities, including the venæ cavæ, the cardiac cavities, and the pulmonary artery, and tried to draw some conclusions with regard to diagnosis. His own cases were examples of simple rupture into the pulmonary artery, but they were so closely allied to the present case that he thought he was justified in referring to them. One of the points considered was the cause of the murmurs, and he could see, especially from the case now described, that the cause of the murmur might be different in different cases. He did not gather whether Sir John Broadbent thought the systolic murmur in this case was due to obstruction of the aorta. Some cases had been published in which so-called continuous murmurs were present, such as were known to exist in many cases of patent ductus arteriosus, which was, of course, a communication between the aorta and the pulmonary artery. It appeared to him probable that the systolic murmur was due to the passage of blood from the aorta into the pulmonary artery, while the diastolic murmur was due to the recoil of the aortic walls continuing the flow of blood into the pulmonary artery; assuming, as he did, that pressure of the blood in the pulmonary artery and the right ventricle was less than that in the aorta and the left ventricle. But it was plain that there was no constancy about the presence of these murmurs, at least with regard to the pulmonary artery. Sometimes there was a systolic murmur, sometimes a double murmur, sometimes a continuous quasi-double murmur, which was not to-and-fro, yet occurred over both periods. He understood the author suggested that the blood went through into the right auricle during the recoil of the aorta. In reference to diagnosis, cases of this condition were very frequently not recognized. Mr. Thurnam, working more as a surgeon and dealing with what were known as varicose aneurysms communicating with large veins, was impressed by the loud roaring murmurs heard in such cases; but these were not necessarily present. In the present case the diagnosis seemed not to have been made even when the patient was at the point of death. One had first to inquire whether there was an aneurysm, and, secondly, whether it opened into another vessel. Even where there was an opening into a vessel it was not always possible to say at what time the communication had occurred. Many of the cases had no sudden access of symptoms at any time; and in others where the symptoms had been aggravated just before death, the orifice of the rupture showed signs of having existed a long time; for instance, there were roughening and thickening of the edges of the aperture, and marks on the vessel wall opposite to the orifice showing that the current had been directed against it for some time. With regard to the question of syphilis raised by Dr. Parkes Weber, the occurrence of repeated pleural effusion in such a connexion was exceptional. It was the present belief that the vast majority of aneurysms were due to syphilis, and surely the occurrence of pleurisy did little to confirm the probability of this origin of the disease. There must have been a considerable number of cases recorded by this time, and the whole question might usefully be re-investigated. By dividing them into ruptures into the various vessels and cavities there should result some gain in diagnosis. One should not be led away by striking features in one case, and imagine that they would necessarily be reproduced in an apparently similar case. In his own paper he had discussed a point in connexion with the symptoms of a patent ductus arteriosus. In a case of this kind the late Dr. Wade, of Birmingham, found that the patient had engorgement of the liver, dropsy of the lower extremities, and albuminuria, without any signs of pulmonary engorgement, such as œdema or induration; and the conclusion drawn by Dr. Wade that the delay in the left heart acted directly through the right heart, and thus spared the lungs, happened to lead to the correct diagnosis. It was clear from other cases that this did not always occur; either there was no dropsy on the one hand, or the pulmonary engorgement took place in spite of the short-circuiting between the two systems of the circulation. It would not be a safe guide, because there were numerous cases of left-sided disease in which the signs of a retarded circulation occurred first in the inferior vena cava area, and not in the pulmonary system.

---

[1] *Guy's Hospital Reports*, 1883-84, xlii, p. 391.

[2] *Trans. Path. Soc. Lond.*, 1874, xxv, p. 56.

Sir JOHN BROADBENT, in reply, said there was no particular hypertrophy of the left ventricle, and he did not see why there should be, as the leakage was not into the left ventricle, but into the right auricle; it was the right auricle which was so dilated. He supposed the reason a diastolic murmur was generated was, that when the leakage took place from the aorta the right auricle was not filled, and there was a considerable rush of blood through the narrow aperture into the auricle. There was no history of syphilis, and the exciting cause of the rupture of the aneurysm seemed to have been the crush between the buffers, but it was quite possible that syphilis may have been primarily responsible for the aneurysm.

11.

Medical Section.

November 26, 1912.

Dr. Frederick Taylor, President of the Section, in the Chair.

A Fatal Case of Widespread Ulceration limited to the Small Intestine.

By Sidney Phillips, M.D.

A boy, G. B., had an attack of rheumatism at the age of 7, a second attack after scarlet fever when he was aged 9, and a third attack in November, 1911, when he was aged 10. On January 4, 1912, he began to suffer from acute abdominal pain and vomited everything he took. By medical advice he was kept in bed and given only hot water, and after forty-eight hours the vomiting ceased, but occasional paroxysms of abdominal pain continued; the bowels were opened daily, and no blood was ever passed. The boy's parents and five sisters and brothers were all healthy.

He was admitted into St. Mary's Hospital on January 18. He was a thin, pale boy; temperature normal. The abdomen was tumid, and there was deep tenderness in the umbilical region; no other sign of disease in any other organ could be discovered. On January 25 and 26 he had slight recurrence of pain in the abdomen, but the temperature never rose above 99·2° F. He improved in general health and left the hospital on February 8; after that, while at home, he had occasional attacks of abdominal pain, and on May 15 he got headache, and the pain in the abdomen became very severe, especially on the left side. There was no vomiting or diarrhœa.

He was readmitted into hospital on May 18 in a collapsed condition, with feeble pulse and clammy sweats; the abdomen was tumid as before, but much more tender.

On the following day my colleague, Mr. Cope, opened the abdomen in the middle line. The appendix was swollen, and there were a good many adhesions in its neighbourhood, which were freed, and the appendix was removed. The small intestine was noticed to be intensely gorged with blood. The patient died on the following day.

At the post-mortem examination by Dr. Spilsbury the peritoneum contained a little blood-stained fluid; the coils of the small intestine were a little distended and were slightly glued together and to the abdominal wall by a small amount of recent plastic lymph; the small intestine for about the middle third was extremely congested on the outer surface and of a deep red colour, and there was a considerable amount of hæmorrhage into the mesentery under the peritoneal reflection; the congestion faded gradually away towards its upper limits. On the outer wall of the congested part were two or three small rounded areas of light yellow colour, with sharply defined margin; they had almost the appearance of infarcts; the peritoneum was not thickened over them. There was no thrombosis of the mesenteric vessels. On opening the small intestine, its inner surface was seen to be intensely congested, and over large irregular areas was entirely denuded of mucous membrane, the submucous and muscular coats being exposed. The yellow areas noted above appeared as shallow ulcers, but except for this there were no solitary ulcers: above and below the congestion and ulceration became gradually less marked until they finally gave place to apparently healthy bowel about 3 in. above the cæcum. The large intestine was quite healthy. The other organs were healthy except for some old pleuritic and slight pericardial adhesions.

Remarks.—I have not been able to find in any medical or pathological work the record of any case in which were found such lesions as existed in this case, situate in and limited to the small intestine. The ulceration was quite unlike that arising from typhoid fever or tuberculous disease, or other known pathological causes of ulceration of the small intestine. The widespread denudation of the mucous membrane and destruction of the deeper tissues with the irregular-shaped ulcers exactly resembled the condition seen in some cases of acute ulcerative colitis. The causation of the disease is unexplained; but there is evidence that colitis may sometimes result from articles of food ingested — perhaps frozen or otherwise preserved — and it is possible that this case, in which the small intestine alone was affected, arose from a similar cause. There is nothing against this in the fact that in colitis the large intestine, and in this case the small intestine was affected, for certain poisons have selective actions on different parts of the alimentary canal; thus corrosive sublimate produces acute inflammation of the large intestine, and tartar emetic poisoning leads to intense inflammatory conditions in the small intestine. Indeed, though the possibility of the present case having resulted from administration of tartar emetic was out of the question, the symptoms that occurred and the lesions found post mortem were more like those arising from tartar emetic poisoning than anything else. When the case first came under my observation the only symptoms were pain and tumidity of the abdomen, and it resembled a case of tuberculous abdominal disease. On the second admission to hospital the boy was in a state of extreme collapse with distension of abdomen, and the possibility of perforation was entertained. The case seems to be unusual enough to merit a place in the records of this Society.

DISCUSSION.

Dr. LANGMEAD said that he had made a post-mortem examination on a somewhat similar case during the last few months. It was that of a boy, aged 9, who had scarlatinal nephritis when he was aged 6. The kidney condition cleared up to some extent, but ultimately he was admitted on account of uræmia, which proved fatal, and was associated with marked ocular changes. There were also convulsions, and during the week preceding the fatal coma he developed much abdominal distension and pain. He had passed loose motions, but no blood. At the autopsy the last 3 ft. of small intestine appeared almost as if they had been the subject of volvulus; these parts were deeply injected and adherent to each other. When the intestine was opened there was found to be extensive denudation with inflammatory thickening, just as Dr. Phillips had described, a condition which reminded one more of acute dysentery than of anything else. There were large undermining ulcers spreading in all directions, and in places nothing remained but the peritoneal coat; in others the mucous membrane remained as small islets only; the condition became gradually more and more marked as the ileo-cæcal valve was approached, but did not extend beyond it. But for the adhesions he thought there would have been perforation. In that case obviously there was a toxin at work—namely, that of uræmia. In uræmic cases one was familiar with ulceration of the large intestine, but not in the small.

Dr. McCULLOCH said that he was inclined to associate the intestinal lesion remotely with the original septicæmic infection of the acute rheumatism. He asked whether the cardiac valves had been scrutinized, remembering the frequency of the rheumatic manifestations, in this case. Dr. Phillips had mentioned that no infarcts had been discovered in the mesenteric arterioles, but it was conceivable that the irregularly situated ulcers might have been produced by minute necrotic areas, following upon capillary infarcts in those situations. Such infarcts would not necessarily be visible post mortem. Such lesions in acute rheumatism were admittedly rare, though occasional spontaneous healing and recovery in aseptic intestinal conditions might occur. The local denudation of the mucous membrane reminded him of the more extensive denudation met with in sprue.

The PRESIDENT (Dr. Frederick Taylor) said the interest of the condition no doubt lay in its rarity. He gathered that the ileum was the part most affected, and he would like to know whether any part of the jejunum was involved in the process. He was reminded of the statement of Sir William Gull, that the jejunum was a part of the intestine which was not prone to ulceration. Recent surgery had enabled one to observe new kinds of ulceration which were not known in Gull's time.

Dr. PHILLIPS replied that it was the ileum only which was affected. He regarded it as a form of ulceration sufficiently rare to make it worth putting on record. There was nothing wrong with the valves of the heart, and all the other organs were healthy. No cause could be found for the condition, but no bacteriological examination was made. The severe collapse led to the suspicion of acute peritonitis, and it was of interest that similar collapse symptoms occurred with the ulceration of small intestine arising from tartar emetic.

Four Cases of Auricular Tachycardia.

By C. EDGAR LEA, M.D.

CASE I.

CASE of paroxysmal auricular tachycardia, with brief but frequent paroxysms, associated with cardiac dilatation. Improvement following rest in bed, causing fewer and shorter paroxysms, and digitalis, which lessens the effects of the paroxysms, by inducing lessened A—V conductivity. Relapse following cessation of digitalis.

P. N., male, aged 62, under care of Dr. Wilkinson, Manchester Royal Infirmary. Admitted July 1, 1912, for bronchitis and dyspnœa, with some œdema of the legs. Patient had been unwell for eighteen months, having peculiar bouts of coughing which came on gradually and were relieved by expectoration of much frothy sputum. There was also dyspnœa. Fifteen months before, April, 1911, he was in the Infirmary under Dr. Bury for urgent dyspnœa, with bronchitis. On this occasion it was noted that there was a well-marked gallop rhythm. Improvement followed rest, and he was discharged in May, only to again return in December, and again on the occasion of his admission last July. In December, 1911, it was noted that his pulse was at about 126, and irregular. There was also much œdema. There was left ventricle hypertrophy, the apex being 1½ in. to the left of the nipple line. A systolic murmur at the apex was conducted to the axilla. Rhonchi and coarse râles were heard all over the lungs, and there was a trace of albumin in the urine, which, however, soon cleared up. There was also some ascites. On January 15 all œdema was gone, and the pulse was now regular at 60. His condition on his last admission was similar to that on previous occasions. Dyspnœa was intense. He was given 7 minims of tincture of digitalis, three times daily, from the day of admission to his discharge in the middle of August. Improvement, as on previous occasions, was rapid.

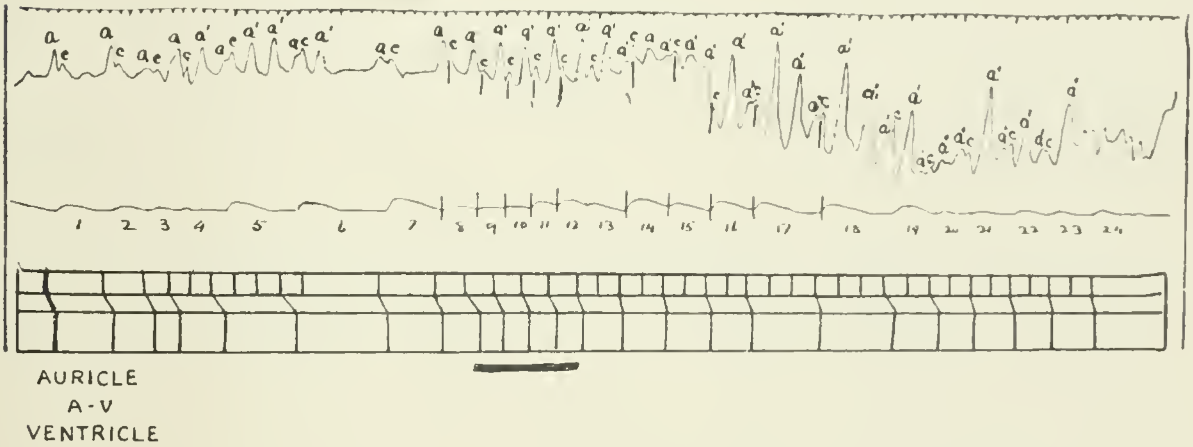


FIG. 1.

August 6, 1912: Tracing taken, showing a brief paroxysm of auricular tachycardia. Cycles 1 and 2 are normal; the ventricle beats prematurely in 3, in response to a premature auricular beat, a^1; the next a^1 is not conducted to ventricle, but the following one, 4, is. Cycle 5 shows two successive blocked auricular beats. Cycle 6 shows the end of the paroxysm with a single auricular beat, a^1, which is ineffective. Cycle 7 is normal, but following it the paroxysm begins again, and lasts till the end of the tracing. For the first five cycles, 8—12, the ventricle responds to each auricular beat. With fatigue of the A—V conducting tissues, blocking now appears: 2—1 block in cycles 13—16; 3—1 block in cycles 17 and 18. Then 2—1 block to the end. Frequency of auricular rate in paroxysms, 120.

My attention was first directed to the case on August 6, when the patient was in very good condition, and presented no urgent signs. I noted that every now and then the pulse, which was usually quite regular at 60 for two or three seconds, seemed to miss altogether at the wrist. These periods were, too, increased in number when the patient held his breath; indeed, they could be invoked as required by this means. The patient himself was not aware of any subjective symptoms. A tracing taken (figs. 1 and 2) showed that these brief periods of apparent cessation of pulse were due to short paroxysms of tachycardia arising, as most tachycardias do, in the auricle. The duration of such periods was usually about five seconds; the frequency of such rhythm was 120 per minute. The number of auricular beats in the paroxysms was about ten or eleven. The explanation of the apparent pause in the pulse at the wrist during these paroxysms was that the ventricular responses to the auricular beats were feeble, owing, probably, to their frequency, and also that in many instances—well shown in some of the tracings—the A—V conducting tissues failed to conduct from auricle to ventricle the full complement of the ectopic auricular beats.

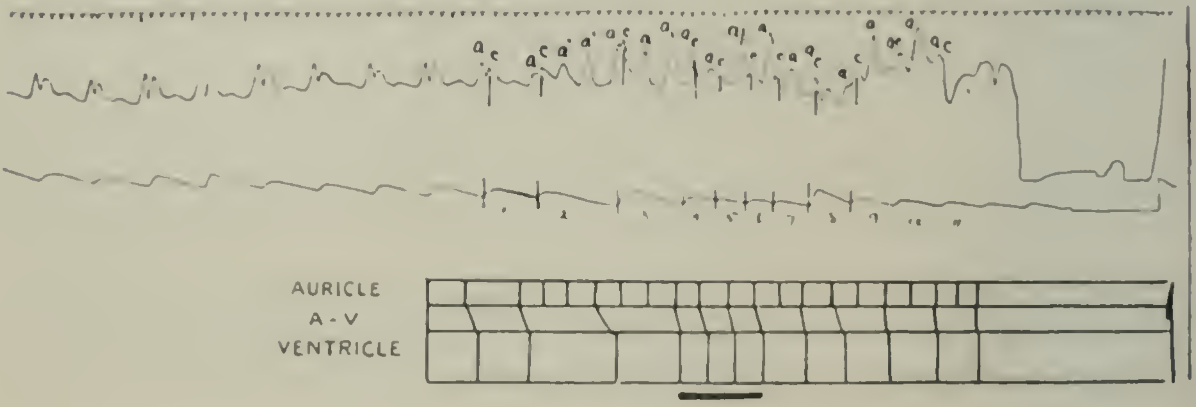


Fig. 2.

Another paroxysm, showing high degree of A—V block at time of onset, so that the rhythm is not, as far as the ventricle is concerned, accelerated until the sixth auricular beat of the paroxysm. After normal ventricular response to four auricular beats, cycles 4—7, 2—1 block remains till end.

Remarks.—It appeared to us that such paroxysms might give the explanation of the clinical symptoms, though previous tracings had not been gained, and since there was in this patient no evidence of either valvular or extensive arterial or myocardial change. We considered that the subjective symptoms might have been mainly due to paroxysmal tachycardia, of prolonged character; that the improvement was due to lessening of the duration of the paroxysms, and also to the blocking, the effects of digitalis, which prevented many of the auricular impulses from eliciting ventricular response. Such an explanation was supported to some extent by the fact that on a previous occasion (December to January, 1912) the pulse-rate fell from 126 on admission to 60, the normal sinal rate for this man. The proof that such suppositions were correct was furnished by a tracing gained on November 20, 1912 (fig. 3). He had been at that date three months out of hospital. During that time he had been attending the out-patient department, but had not been given digitalis in any form. The result of this was that the blocking effects of this drug were withdrawn, and the effects of complete rest similarly, so that when I saw him on November 20 his general condition had much deteriorated. There was dyspnœa, œdema of the legs, and marked signs of cardiac dilatation. The right border of the heart extended 2½ in. to the right of the midsternal line; venous pulsation in the neck was prominent, and although at the apex no murmurs were heard, there was at the tricuspid area a short, rough systolic murmur. The pulse was markedly irregular and rapid, at frequency 132. A tracing showed (fig. 3) that the arrhythmia was due, as one expected, to frequent paroxysms of auricular tachycardia. Their individual length was not different to the previous occasion, but their frequency of incidence was much greater. Further, all the auricular impulses excited ventricular response, and this accounted for the high ventricular frequency. At one period only was I able to gain a normal auricular action of any length (fig. 4). Here the auricular frequency was at 84.

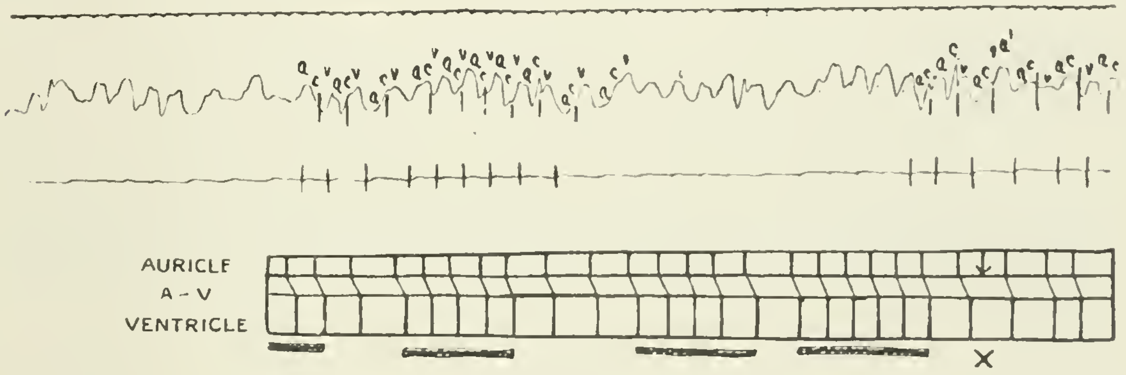


FIG. 3.

November 20, 1912: Tracing showing the more usual character of pulse on this day than in fig. 4. General arrhythmia, due to frequent brief paroxysms of auricular tachycardia. The auricular beats in all instances but one (which is doubtful, marked ×) cause ventricular response. The paroxysmal frequency is 170, as compared with 120 in earlier examples. General ventricular frequency, 132. Ventricular tracing shows some resemblance to that often seen in auricular fibrillation.

Case II.

Continuous auricular tachycardia of frequency 260. Partial A—V block, 3—1, 4—1, due to digitalis, causing ventricular frequency, 78 or thereabouts. Relapse to 2—1 block with cessation of this drug, with corresponding increased ventricular frequency and general symptoms.

J. S. Patient was a well-developed male, aged 57, a postman by occupation, who had never till the present illness had a day's sickness in his life. Almost a teetotaler, he was a careful liver. He was admitted to the Manchester Royal Infirmary on June 12, 1912, under the care of Dr. Reynolds, for dyspnœa. He had been quite well up to seven months previous to admission. His first symptoms were dyspnœa. In February he felt a "clutching" at the heart, which subsided with rest. Œdema appeared in May. There was never palpitation. I first saw him on July 15. Then he was much improved. All œdema had gone, and there were no subjective signs. The heart was beating apparently regularly at 135 per minute. The apex was in the nipple line. There were no murmurs. The right side of the heart extended 2 in. to the right of the mid-sternal line. The patient volunteered the information that he had, for the last four or five months, had over this area an aching pain of gradual onset, often associated with cough. This lasted for about a quarter of an hour, and for a few minutes there was a "throbbing" over the heart. There was no pulsation visible in the neck.

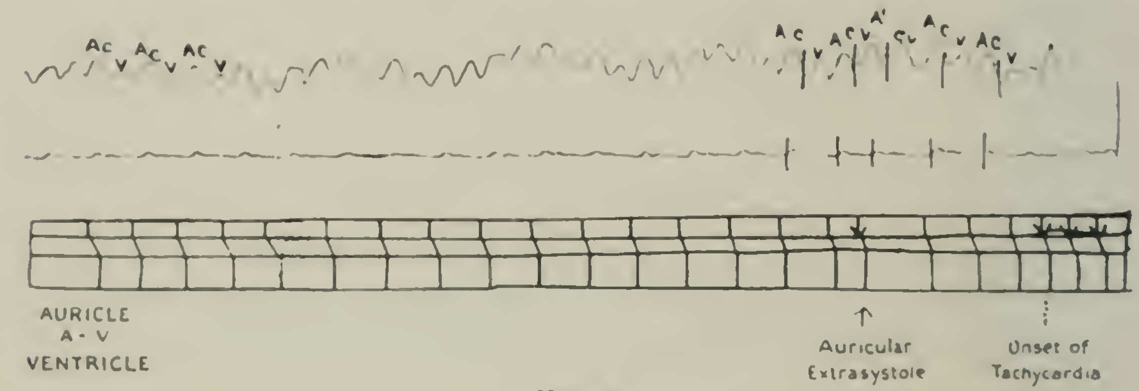


Fig. 4.

November 20, 1912: Tracing showing period of normal frequency, A and V = 81. One auricular extra-systole is seen, and, shortly after, the onset of a paroxysm of tachycardia.

Previously to my seeing him it was stated that on admission his pulse was rapid at about 135. From June 12 to July 6 he had been given tincture of digitalis. This drug had been discontinued as the pulse was on July 6 of much slower frequency, at about 80, but irregular. Within the last nine days the pulse had increased in frequency from 80 to 135, during which time the digitalis had been discontinued. A tracing taken during this time (on July 15) (fig. 5) revealed the true state of affairs. The venous tracing showed that the auricles were beating at a regular frequency of 260 per minute; the ventricular frequency was exactly half at 130. There was therefore a 2—1 A—V block. At our suggestion, with the idea in view that digitalis, by its inhibiting effects on A—V conductivity, would increase the degree of block and thereby lessen ventricular frequency without necessarily checking the auricular tachycardia, this drug was given, starting on July 16 with 10 minims of the tincture three times a day. There was, as was expected, a repetition of the slowing effect previously seen (June 12 to July 6) when he had been having this same treatment. But now the method of action could be readily seen. It acted by increasing the degree of A—V block, so that by July 20 there was a 3—1 block, and, though the auricular frequency was not effected, the ventricle was now beating at 86 or thereabouts. Over long periods the pulse would remain perfectly regular at this frequency, but occasionally the degree

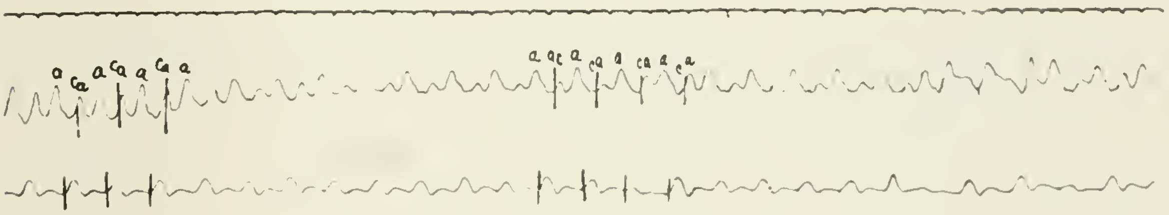


FIG. 5.

July 15, 1912: Auricular frequency, 260; ventricular, 130; 2—1 block. Similar tracings to this were gained in October, 1912, when the patient had not been taking digitalis, and consequently the degree of A—V block gained as seen in tracing (fig. 6) through this drug was lessened, with resulting increased ventricular frequency.

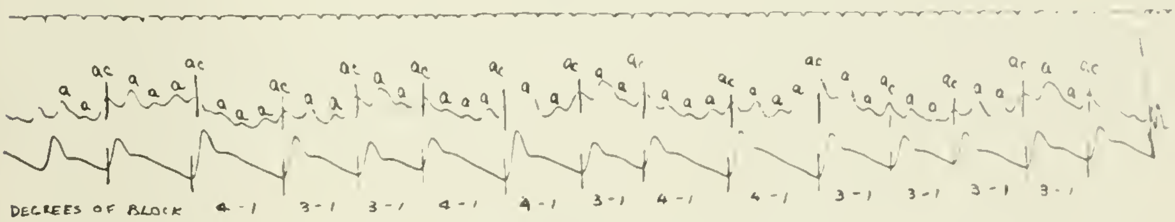


FIG. 6.

July 22, 1912: Auricular frequency, 252; ventricular 78; irregular variations in degrees of block from cycle to cycle.

of block altered from cycle to cycle, so that one would get runs of 3—1, 2—1, and 4—1 mixed up, giving the irregular character of the pulse previously seen when this drug was given (fig. 6). I took many tracings from day to day. Once only I saw an instance where two successive auricular beats caused ventricular response. This was for only a single cycle. In other parts of the many tracings I saw instances of 5—1, 6—1 (fig. 7), and one example of nine auricular beats to one ventricular. The length of this ventricular pause was 1·4 seconds. The digitalis was continued until the patient's discharge on August 13. During this time the degree of block remained *in statu quo*. But on August 7 I gained a tracing (fig. 8) which showed for a short time an apparent reversion of the auricle to its normal rhythm of frequency about 60. This lasted for only a few minutes, and on asking the patient to move his arms up and down for a little time the auricle again relapsed into its former state. I have seen this patient three times since his discharge, the last time, November 2. He keeps in good health, and this is somewhat to be wondered at, as he is taking no drugs, and his ventricles are again working at half auricular frequency—namely, 130. Such a condition has now been present for three months. One noticeable feature about this persistent rapid ventricular rhythm is its apparent independence of exertion or emotional conditions, and in this respect it somewhat resembles

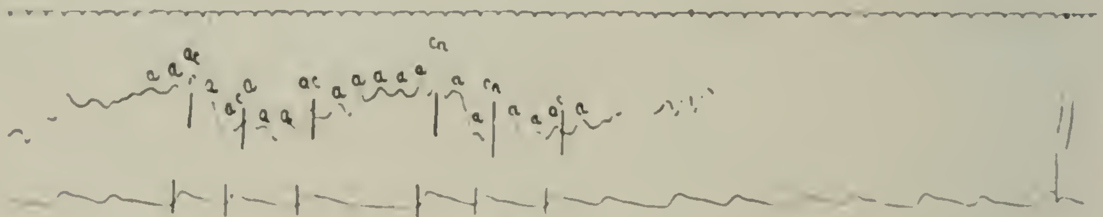


FIG. 7.

July 20, 1912: Four days after commencement of digitalis; example of 6–1 block; auricular frequency, 240; total ventricular frequency, 74.

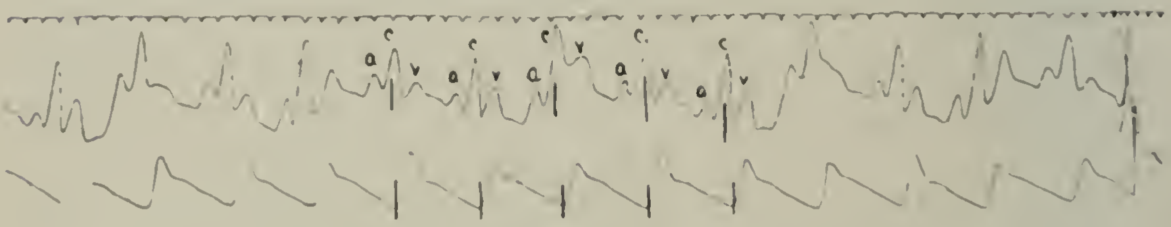


FIG. 8.

August 1, 1912: Period of apparent normal auricular action. Auricular frequency, 65. Note the large and bold character of the waves as compared to previous two tracings, especially the "c" wave.

the idioventricular rhythm. It is a severe test for the myocardium, this continued tachycardia, and that the patient bears it so well is a proof of its healthy condition, though the fact that, having a pension, he can lead a quiet life, favours his case.

Remarks.—This case is an example of auricular "flutter," of which several have lately been published. One of the first, I believe, was shown before the Royal Society of Medicine by Dr. Hertz and Dr. Goodhart. Rihl, in Germany, and Lewis in this country, among others, have described such cases. My own makes, I believe, the twelfth reported case. The interest here is in the contrast presented by it to the previous case. Recovery, or rather—since in neither case do we pretend to have checked the auricular tachycardia—palliation of its effects, is in the former case due to one cause over which we have little control—namely, the lessening incidence of the paroxysms—and to another—namely, A—V conductivity, which we can in many cases influence to a marked degree. Palliation in the latter case is due wholly to blocking induced in the A—V tissues—tissues, fortunately, which show in this case a ready response to digitalis. Not so fortunate, however, are we in all cases, as the next two instances will show.

Case III.

Sudden inception of tachycardia of frequency 160, occurring in case of mitral stenosis. Continuance of same to death of patient four days after. No effects from digitalis.

M. S., patient, a female, aged 40, was admitted to the Manchester Royal Infirmary, under the care of Dr. G. R. Murray, for dyspnœa, cough and dropsy. The case was a typical one of mitral stenosis, verified post mortem, and into the physical signs one need not enter in great detail. From the date of her admission, October 24, 1911, up to December 15, her condition improved somewhat, although dyspnœa was easily induced, and there was a certain amount of albumin in the urine throughout. An attempt to try to get the patient up in the wards in the middle of November was not successful, and she had to return to bed. Up to December 15 the pulse remained regular, fair tension, at frequency 99 (tracing, October 28, fig. 9). On December 15 the patient, of her own accord, decided to go home. Later in the day she was undecided, and showed some mental disturbance and excitability at the prospect. All thought of going, however, was quickly disposed of, for she suddenly became much worse. Dyspnœa increased in severity; prostration was marked. Seen by me on December 16, her aspect was one characteristic of some cases of tachycardia. The hands were outstretched on the bed; the breathing was rapid, and intense thirst was the chief complaint of the woman. A tracing taken showed that the pulse, which at the wrist was uncountable, was going at a rate of 168 (fig. 10), but quite regular. The heart dullness to the right of the sternum was increased from what it had been previously. On December 17 there was a smart attack of hæmoptysis; the pulse remained as before. The next day a tracing showed the same rapid frequency, though now there was slight irregularity of rhythm, so that one could not exclude the possibility of auricular fibrillation, more especially since the "A" wave might have been obscured by the large size of the preceding "V" wave. The patient died on December 20.

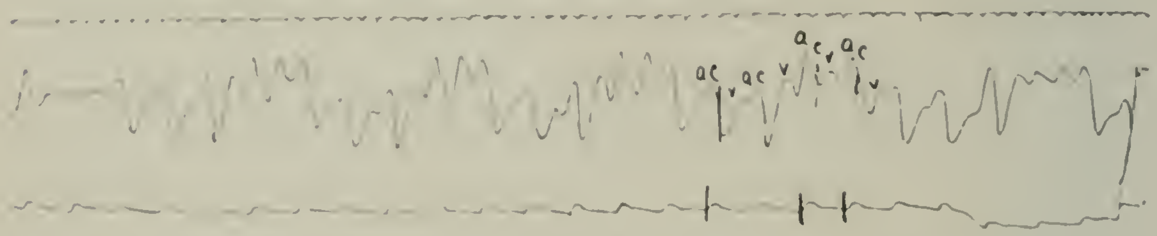


FIG. 9.

Tracing, October 28, 1911: Normal auriculo ventricular sequence; frequency, 99 per minute.

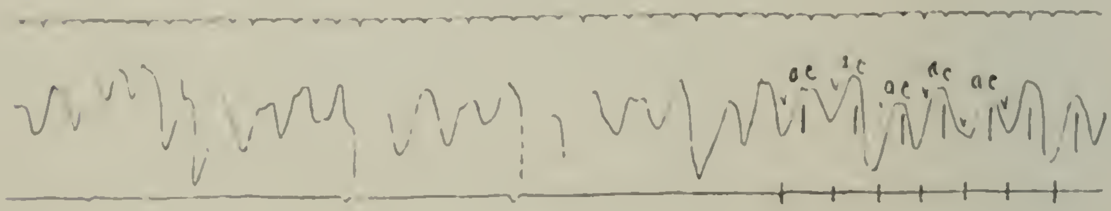


FIG. 10.

Tracing, December 16: Normal auriculo-ventricular sequence (probable); frequency, 144; in other tracings the frequency was at 160. The other possibility in interpreting this record is that of auricular fibrillation. It is possible both conditions might have been present at different times.

Remarks.—This is an example of the grave effects which can follow the inception of a rapid auricular rhythm. It is suggested that, from the abrupt onset of the symptoms, such tachycardia was, pathologically, of paroxysmal type, and in that respect, therefore, similar to the cases just considered. The end of the case, however, was very different. There was no cessation of the tachycardia from the time of its inception to the death of the patient. In this it differed from Case I. Further, though digitalis was given in large doses (infusion 2 dr. three times daily, December 17 to 19, and four-hourly, December 19 to 20), there was no apparent effect either on the auricular frequency or, what would have been especially useful in this case, on A—V conductivity. This latter absence of effect might have been anticipated, since the patient had had many preparations of drugs of the digitalis series throughout her stay, but no A—V effects had been observed, though in regular pulses such are not readily detectable.

CASE IV.

Brief but frequent paroxysms of auricular tachycardia, frequency 180, occurring in patient suffering from lymphocythæmia. Full ventricular response. Death of patient. No effect from digitalis.

M. C. Patient, a female, aged 50, was admitted to the Manchester Royal Infirmary under the care of Dr. Brockbank, for sore throat and lumps in the neck. Swallowing was painful, and there was some obstruction to respiration. The case proved to be acute lymphocythæmia involving especially the cervical lymphatic glands (post mortem). The interest in the case for our immediate purpose concerns the cardiac condition. Admitted on August 26, 1912, I saw her first on September 27. My attention was directed to a peculiar fluttering in the jugular veins in the neck. The pulse was feeble and gave the impression of irregularity. I was not able to count it at the wrist. A tracing showed the ventricles to be beating regularly in response to auricle, at 180 per minute (fig. 11). A few minutes afterwards I asked a clerk in the wards if he would feel the pulse, and tell me what frequency it was. My object was to see whether he could count a pulse at so high a rate. To my surprise he told me it was 100. I confirmed his statement, and took another tracing (fig. 12A). The pulse was now at 100, but even whilst I was taking it it abruptly increased again to 180 (*see* tracing). Here was another case

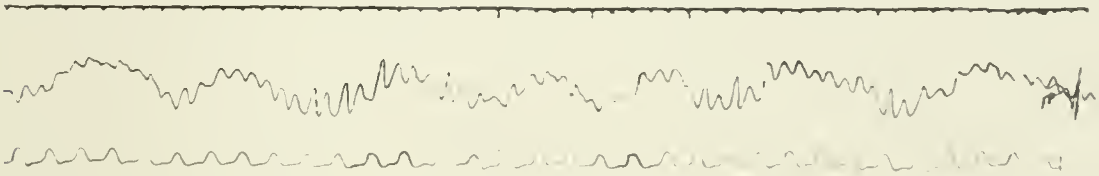


FIG. 11.

September 30 (first tracing): Auricular frequency, 180; ventricular, ditto. Regular rhythm. Low tension radial pulse.

of auricular paroxysmal tachycardia. Though the patient was having digalen, 10 minims, three times daily (from September 27), this drug did not appear to influence the frequency. There was certainly in my tracings no evidence of its action on the A—V tissues. The patient showed features which in many ways resembled those of the previous fatal case, especially in the intense thirst and prostration. There was not, however, the same degree of right-sided dilatation as in Case III. The patient died on October 2, up to which date these frequent paroxysms continued.

Remarks.—It is difficult to say to what extent the inception of tachycardia affected the fatal issue of this case. That it would hasten it seems probable, though its effects in this direction may not be so great as in Case III, where there was, in addition, extensive valvular damage, and probably myocardial as well. Speculative only can be any suggestions as to the extent to which the primary lymphocythæmia might have been responsible for the tachycardia. There was no obvious macroscopic change in the heart, though the myocardium was described as being friable and pale, with slight attempts at tabby-cat striation.

CONCLUSION.

The cases just noted demonstrate the vulnerability of the auricle to functional defects, and the grave effects to which such may, in some instances, give rise. The conception that this chamber is a negligible quantity as far as the cardiac activities are concerned receives little support from such observations. The cases can, fortunately, under skilful treatment, redound very considerably to the credit of the cardiologist; their recognition being, for such satisfactory results, of essential importance. In some cases this is easy, even in the absence of graphic records. Such a case is exemplified in Case IV. Less easy to recognize, however, are those associated with defective A—V conductivity. In such one may have all degrees of both rhythm and frequency. If the block is high and of equal intensity over long periods, the pulse may be within normal limits of frequency and perfectly regular. In such cases there is nothing to tell in absence of graphic records. A natural corollary to this, however, is the fact that where such is the case little treatment is necessary. Where the block is irregular in character, as in Case II, the irregularity may be indistinguishable from some types of auricular fibrillation. Where the paroxysms are brief and transitory, detection may be a matter requiring the most careful and constant observation. That treatment, where tachycardia is present, is to be directed to the conservation of the ventricular myocardium is obvious. For this purpose digitalis, by its blocking action, is especially good. Its use can be continued indefinitely. That a strain is thrown on the ventricle by rapid auricular rhythms is prettily shown in the last case I wish to refer to, a single tracing from which will illustrate all one wishes to note (fig. 13); a short paroxysm of auricular tachycardia, immediately followed by a brief period of ventricular alternans, pathognomonic of failing contractility, and incited

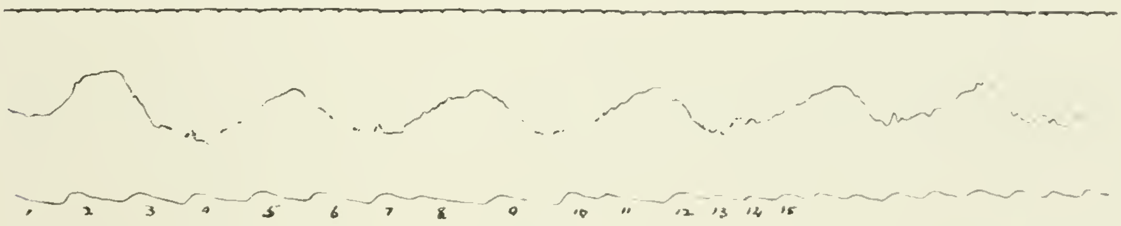


FIG. 12A.

October 2 (second tracing): This shows the inception of attack of auricular tachycardia (radial tracing only satisfactory). Cycles 1—6 normal, at frequency 90. Cycle 7 is short, due to premature extra-systole, arising probably in the auricle (since the sum of the premature and compensatory cycles, 7 and 8, is less than that of two normal cycles). Cycle 9 is normal. Cycle 10, another premature beat, followed by compensatory pause (cycle 11). Then starts the paroxysm, continued in next tracing (third).

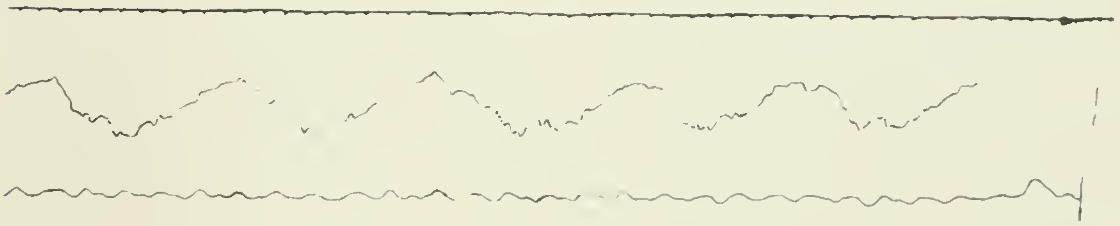


FIG. 12B.

October 3 (third tracing): Continuation of paroxysm, starting as shown in the previous tracing.

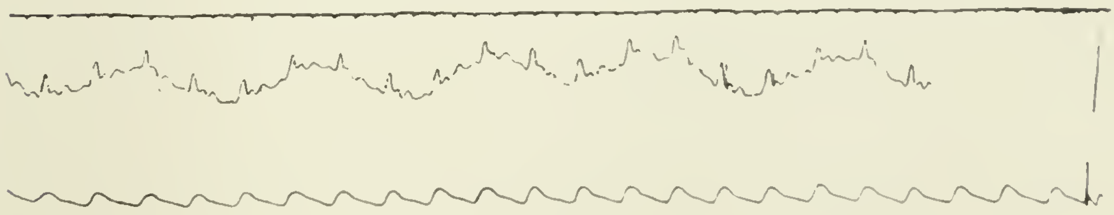


FIG. 12C.

September 30 (fourth tracing): Normal frequency, showing auricular and ventricular normal sequence of frequency 132.

by the added strain thrown on it by the tachycardia, to which it has just responded.

Lastly, reference must be made to treatment aimed at causing cessation of the tachycardia at its origin, namely, the auricle. Mackenzie has shown that with digitalis flutter can, in many instances, be converted into fibrillation. With cessation of the digitalis the auricle may suddenly revert to the normal rhythm. This fact has been so often demonstrated (Mackenzie, Lewis and others) that it should in all cases be given a trial. In Case II it is probable that, if the digitalis had been further pushed, this effect could have been gained. Unfortunately, the patient left hospital before this could occur.

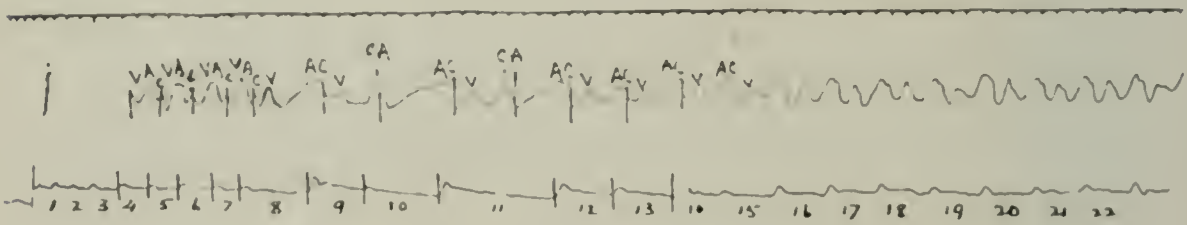


FIG. 13.

Showing portion of an accelerated auricular rate (seven cycles, 1—7), followed by pause, cycle 8. Then cycles 9 and 10 represent a ventricular extra-systole coinciding with normal auricular beat, with radial response thereto. Cycle 11 represents a similar condition, but here the ventricular beat fails to reach the radial. Cycles 12—15 show alternans suggestive of ventricular depressed power of contractility due to tachycardia, and also, possibly, the two successive extra-systoles. Cycles 16 onwards represent the normal rhythm frequency of 96. Auricular tachycardia at 120.

DISCUSSION.

Dr. Gossage said he had had but small experience of the condition, though he had been on the look-out for such cases for years. One needed to get patients under strict observation in order to be sure whether they had auricular tachycardia or not; and sometimes even then it was difficult to catch the patient in an attack. Four years ago he came upon a case which seemed to be definitely an example of this condition. The patient was a man, aged 20, who had had rheumatism, and was left with incompetence of mitral and aortic valves. When he first came in April he had dyspnœa and swelling of the feet, his liver was enlarged, and his pulse-rate was 200 per minute. He then considered the rapidity of beat was secondary to heart failure. The hospital was full at the time, so he gave him 5 minims of digitalis, and told him to go to bed at home. He returned next week practically well, stating that he had got better in three days, and he remained well, and went back to his work until the following February. At the latter date he came up again in a similar condition as at first and was admitted into hospital, where a tracing was obtained from his pulse, which was again 200. The physician under whose care he was gave him 7½ minims of strophanthus, and in three days he got better and the œdema disappeared, the liver also returning to its normal size. Subsequently the man was under his care until about a year ago, and was seen frequently. According to the man's own statement attacks the same as before, but shorter, occurred fairly often, but now they got well without treatment. So one had to conclude that the digitalis administration was merely coincident, and was not the cause of the previous improvement. The man's normal pulse-rate was about 60. Gossage showed tracings both normal and during an attack. In this case there was no question of heart-block: it was simply paroxysmal tachycardia, which got better when the paroxysm ceased.

Dr. ALEXANDER MORISON questioned the appropriateness of the term "auricular flutter." He was himself in the habit of dividing true auricular tachycardia or tachycardia limited to the auricle from cases which might be termed auriculo-ventricular tachycardia in which both chambers participated. He published his first case of the former in July, 1908, although he had observed the case at the Great Northern Hospital five years earlier. His attention was drawn to the condition accidentally. A woman who had been under his care at the Hospital for two or three months was critically ill with valvular disease, aortic and mitral. On examining her one day stethoscopically in the jugular region he detected a peculiar sound indicative of a very high rate of pulsation. He drew the attention of Dr. Clifford Beale to it, who said he had not heard anything of the kind before. Her water-logged condition improved, but not what he then called the jugular embryo-cardia, because it was exactly similar to the sounds heard in the heart of a seven months' fœtus. She died three months later, and this embryo-cardia persisted to the end. The auricular pulsations were recorded by the polygraph. He was not aware that the fact of the condition being likewise audible had been mentioned. He considered the term "auricular flutter" somewhat of a misnomer; it was a true auricular tachycardia, and was to be sharply demarcated from cases in which there was auriculo-ventricular tachycardia which, paroxysmally or more persistently, was more common. The *rationale* of the action of digitalis in reducing ventricular rate, when it did so, in these cases, was still *sub judice*. In a paper read before the Society last summer Professor Cushny[1] produced some evidence to show that, although he had put the pneumogastric out of action by atropine, or supposed he had done so, the A—C interval was not lengthened and therefore blockage of bundle was absent, and he considered that there probably was a more direct action on the ventricle itself, of a nutritional or other character.

Dr. A. H. COOK mentioned the case of a young lady whom he had had under his care for four years, whom Dr. Mitchell Bruce and Dr. Price had examined, the latter with the polygraph and cardiograph, and concluded it was an instance of auricular fibrillation. Dr. Bezly Thorne had made frequent observations with the sphygmometer, and thought the symptoms might be due to colitis, which he found was present. Her attacks of tachycardia appeared to be due to low blood-pressure, and he asked what relation that bore to ordinary auricular paroxysmal tachycardia. The patient, during these four years, had been in bed, unable to do anything, and was subject to attacks of collapse, almost amounting to catalepsy, during the fortnight following the monthly periods. This seemed to suggest that some abnormal substance was produced in connexion with her generative organs. On trying to stand, the pulse-rate increased—namely, from 72 to 160—she became short of breath, and if not allowed to sit down she would faint. Digitalis made her so sick that it had to be given up. She had typhoid fever some years before, and had a great shock on the death of her father. In reply to the President, he said the tachycardia lowered the blood-pressure—already low—still further. He showed a tracing from the case.

---

[1] *Proceedings* 1912, v (Therap. Sect.), p, 200.

Dr. G. W. GOODHART asked whether the author's investigations had led him to any conclusions as to the manner in which the ventricle let the auricle know that it had finished its work and that it was time for the auricle to begin. It seemed to him that some such message must be sent, and that cases of rapid auricular beat were of special interest in that they provided an instance in which this mechanism had gone wrong. With regard to auricular flutter, he understood that other investigators claimed that digitalis given in sufficient doses sent the auricle into fibrillation, and that if the drug were then stopped, the heart suddenly dropped back into a normal rhythm; this did not appear to have occurred in Dr. Lea's case, as although varying degrees of block had been produced the auricular rate had remained absolutely unaltered. He submitted that in these cases the primary fault was inhibition of the impulses normally controlling the auricle. He was grateful to Dr. Morison for expressing his doubt as to the mode of action of digitalis in these cases; he had himself the greatest difficulty in believing that it necessarily produced its effect by causing heart-block. Dr. Hertz and he had reported a case in which there was absolute and permanent dissociation between auricle and ventricle; whilst the auricle remained constant at 232 the ventricular rate could be altered at will by exercise or atropine from a normal of 80 to anything up to 150, or it could be slowed by digitalis to 40; here there could be no question of heart-block, and it might well be that the explanation that lay at the bottom of this case, whatever it might be, would suffice to explain cases of auricular flutter and their response to digitalis without recourse to the hypothesis of heart-block.

The PRESIDENT said that what struck him in reference to this paper was the question of the action of digitalis. Recent work in connexion with this subject had produced many statements with regard to the action of this drug which were somewhat confusing. In Dr. Lea's third case 10 minims of digitalis were administered three times a day, and apparently with immediate benefit, and in the fourth case the dose was 7 minims three times a day. Formerly, when tachycardia had not been investigated by modern methods, the impression obtained from experience was that digitalis did no good whatever. Yet now remarkable results were attributed to the taking of doses of digitalis which were comparatively trivial. What doses did Dr. Cook give? [Dr. COOK: 10 to 15 minims three times a day.] On the other hand, a patient with mitral stenosis and irregular heart could take 15 minims every four hours, or $1\frac{1}{2}$ dr. a day, before any beneficial effect was produced. Comparatively recently it was stated that the five properties of cardiac muscle—viz., contractility, rhythmicity, tonicity, conductivity, and excitability—were all depressed by digitalis. He admitted that other statements were to the effect that tonicity at least might be increased. And yet the value of digitalis was admitted on all hands. Further observations had shown that digitalis would produce heart-block, premature beats, and auricular fibrillation, and nevertheless when given during auricular fibrillation would steady the ventricle and so do good. Apparently digitalis only caused heart-block when the A—C interval was already lengthened. He would like to know whether it was demonstrated that in cases in which the pulse was so exceedingly frequent the A—C interval was lengthened, so as to allow of the desired blocking action of digitalis, even in the small doses mentioned.

Dr. GOSSAGE said that the action of digitalis was a large subject. In Dr. Lea's cases there seemed to be something amiss with the conductivity. Often, in cases of rapid heart, one could give large doses of the drug without producing much effect on the heart-rate. Apart from auricular fibrillation, it was usually where there was something wrong with conductivity that digitalis produced striking effects by the production of heart-block. In a case of his own, beats were missed while the patient was having only 5 minims of digitalis thrice daily, but in other cases he had given 15 minims every four hours without causing heart-block. As a rule in auricular tachycardia, while the auricle was beating very rapidly there was a shortening of the interval, because the impulse was supposed to start from somewhere else than the normal site, somewhat nearer the ventricle. With damaged conductivity where the heart was beating so rapidly one would expect beats to be left out, because with that rate there would not be time for the connecting link to recover its functions before the next beat. That was so in Dr. Lea's Case I. It was very important to distinguish between auricular fibrillation and auricular tachycardia, as they were separate conditions. When fibrillating, portions of heart muscle were beating independently of one another, but in tachycardia the auricles beat quite normally. Whether the ventricles beat at the same rate as the auricles depended on whether there was heart-block. In the case he had mentioned the auricles and the ventricles were both beating at 200 per minute.

Dr. LEA, in reply, said that he felt much interested in the case of tachycardia mentioned by Dr. Gossage, which apparently varied in the intensity of its symptoms in proportion to the duration and frequency of the paroxysms, rather than to the digitalis received by the patient. And his own brief experience amply bore that out; it was specially shown in Case II. With regard to Dr. Morison's objection to the term "flutter," it was not his own term, it occurred in an article in the current issue of the *Lancet*. He believed there was a clinical distinction between cases of so-called rapid flutter, with auricular rhythms up to 260 per minute, and cases of auricular paroxysmal tachycardia, in which the auricular rate seldom exceeded 180. He did not wish to expound fully his ideas on cardiac conductivity, but he desired to associate himself with Professor Cushny's views, which did not appear to preclude the association of heart-block with changes in the ventricle as well as in the bundle. If one regarded the conducting system as a whole, as comprising the local area known as the bundle and what one might call the conductor-effector area, represented morphologically by the Purkinje system, and which must be equally part of the conducting system, whilst one could expect lesions of the local area to produce block, yet there was no reason why, similarly, alteration of the conductor-effector system in which the ventricular muscle must be concerned could not equally produce block to a certain extent. He agreed that the site of action of digitalis was not yet settled. Whether or not the ventricle communicated with the auricle he did not know. With regard to the relationship of auricular fibrillation to asthmatic attacks, he had personally collected records of about ninety-nine cases of fibrillation, all confirmed graphically. One did not wish to draw rigid conclusions from such a number; moreover, they were mostly hospital cases, here to-day and gone to-morrow. Still, in them he had not seen anything approaching true asthmatic attacks. He was unable to find, in his four cases, a prolonged A—C interval, but he did not think that necessarily excluded the possibility of defective conductivity existing. Where digitalis had such good effect, the presumption was favoured of the existence of some degree of pre-existing block. He thought that was so because the bundle took some time to recuperate, though the rapid rhythm militated against showing objectively the prolongation of the interval.

31.

Medical Section.

January 28, 1913.

Dr. Frederick Taylor, President of the Section, in the Chair.

Some Observations upon the Results of Four Years' Work at King Edward VII Sanatorium.

By Noel Dean Bardswell, M.D.

July, 1911, brought to a close the fifth year's work of the King Edward VII Sanatorium. Throughout these five years the treatment carried out at the sanatorium was constant, on the orthodox lines of what is generally spoken of as "The Sanatorium Treatment." Throughout the same period the patients admitted for treatment, taken as a whole, also remained remarkably constant in respect of age, clinical condition, sex, social condition, length of stay, &c. In consequence of the consistency of these various factors, the immediate results of treatment, as shown by the statistics of the condition of patients on discharge, have been wonderfully uniform year by year. At the present time, then, at a distance of some eighteen months from their completion, we are able to take a survey of five years of uniform work, carried out on the recognized principles of sanatorium treatment. A critical review of this work should furnish reliable data upon which to form an opinion as to how far the treatment as carried out at the sanatorium has proved a success or a failure. My reason for thus drawing a line across the work of the sanatorium in July, 1911, is readily explained. During the year beginning July, 1911, the conservative nature of the sanatorium routine was materially modified by the adoption of tuberculin treatment. Commencing somewhat tentatively, the proportion of patients in residence, treated with tuberculin, steadily increased, and for some considerable time now some 75 of the 100 patients in the sanatorium have been receiving tuberculin. Apart from the use of tuberculin, the conditions of the sanatorium since July, 1911, in respect of the various factors mentioned above—e.g., class of patient admitted, general lines of treatment, &c.—have continued to be as constant as in the previous years. It is clear, then, that should there be any material change in the results obtained at the sanatorium, subsequent to this date, the change will be due to the new element—tuberculin. The first five years, which I may term the pre-tuberculin years, in short give us a most valuable control with which in due course to compare the results of a tuberculin era. It is my present purpose to try to epitomize the results of this pre-tuberculin period into some concise and definite shape which may serve as a standard for comparison.

METHODS OF COMPARING THE VALUE OF VARIOUS FORMS OF TREATMENT OF PULMONARY TUBERCULOSIS.

In making the epitome or review, it is necessary to bear in mind the particular purpose for which it is intended, and to concentrate attention upon the features which are likely to be of most service. The usually adopted method of detailing in statistical form the clinical condition of a number of patients before and immediately subsequent to any particular form of treatment has its use, but is far from being satisfactory. It is unsatisfactory inasmuch as statistics very often fail to furnish the reader with uncontrovertible evidence that all the cases treated were actually suffering from pulmonary tuberculosis, and again in that such expressions as "improved," &c., are of but small value as scientific evidence. In statements *re* diagnosis and results of treatment, there must needs be so much of the personal equation. Evidence tendered in support of any method of treatment, if it is to carry conviction, must be made up of facts which can readily be verified.

With respect to pulmonary tuberculosis the position is really a fairly simple one, since the test of efficacy of any form of treatment is so obvious. We have only to be absolutely sure that (1) every patient treated was beyond all manner of doubt suffering from pulmonary tuberculosis, and to know (2) what has become of these same patients, say two, five, and ten years later. With these data, there is small scope for fallacy. They consist of facts, not mere expressions of opinion.

(1) *With Respect to Diagnosis.*

There is no call for me to waste your time in considering this well-worn subject. The necessity of early diagnosis, long and ably preached by many, is universally recognized. Unfortunately, looking at the matter from the point of view of the statistician, early diagnosis, at its best, means the recognition of the disease in the absence of the tubercle bacillus. It means the making of a positive diagnosis upon an association of various signs and symptoms, the recognition of which, and still more the interpretation of which, are matters of individual skill and judgment. The personal equation therefore plays a large part. Signs and symptoms which amply justify the individual physician in making a positive diagnosis and treating the disease as certainly existing, are not sufficient evidence when transferred to statistics. The inclusion of these unproven cases amongst the records of other cases, unquestionably tuberculous, exposes the author to the criticism that it is by no means clear that all his cases were suffering from pulmonary tuberculosis, a criticism which allows of no very adequate retort.

It is best, then, to face the position and to admit that, statistically, there is only one certain test of the existence of pulmonary tuberculosis—namely, the presence of tubercle bacilli in the sputum. I would suggest, then, that any method of classifying patients for statistical purposes should begin by dividing the patients into two groups: (*a*) Those with tubercle bacilli; (*b*) those without tubercle bacilli. When dealing with large numbers, the group of patients without tubercle bacilli will in fact include a great many cases beyond all manner of doubt tuberculous, although lacking the positive proof. The percentage of such cases, however, varies with different observers, hence the necessity of one common denominator—the presence of the tubercle bacillus. It is clearly a lesser evil to exclude some definite cases than to record a proportion of non-tuberculous people as having been benefited or cured by some method of treatment. I need not remind you that it is usual to classify a series of cases of pulmonary tuberculosis into three groups. The numerous methods of classification that exist are sufficient proof that no method is or can be entirely satisfactory. All said and done, the various methods do but show that there are three main types of consumptive:—

(1) The slight case—Group I.
(2) The moderately bad case—Group II.
(3) The very bad case—Group III.

Exactly how one describes these three types is of little moment, so long as they are clearly defined.

At the King Edward VII Sanatorium the cases are classified into three groups by the Turban-Gerhardt method, as recommended by the International Tuberculosis Committee. For details see footnote.[1]

(2) *The Ultimate Results of Treatment.*

There is little to be said on this head. Information as to the condition of patients subsequent to the completion of a course of treatment is often troublesome to obtain. The King Edward VII Sanatorium draws its patients from all parts of the United Kingdom, and it is only possible to keep in touch with them by means of the post. An annual census is taken, but, with every possible care, the annual returns are incomplete. Municipal dispensaries, which supply the needs of a definite area, should experience considerably less difficulty in tracing the after-histories of their patients.

Immediate Results of Treatment.

I should perhaps refer to immediate results. As evidence of the usefulness of any method of treatment, records of the immediate benefit received by consumptives, given in terms of "improved," "much improved," &c., are not of any great value. In practice, the presence or absence of tubercle bacilli and the amount of exercise a patient can take are the most useful points on which to have information. In sanatoria it is but rarely that a patient, even if far advanced, fails to improve; indeed, a method of treatment which fails to benefit, even if only temporarily, the very large majority of cases treated by it, needs no further investigation. Thus it is that statistics of immediate results have but small significance compared with similar records of ultimate results.

---

[1] "International Statistics on Tuberculosis (Morbidity). Classification Turban-Gerhardt (Imperial German Board of Health)": (1) Disease of slight severity, limited to small areas of one lobe, that, for instance, in case of infection of both apices does not extend beyond the spine of scapula and the clavicle, or in case of affection of one apex, frontal beyond the second rib. (2) Disease of slight severity, more extensive than (1), but affecting, at most, the volume of one lobe—or severe disease, extending at most to the volume of one half lobe. (3) All cases extending beyond (2), and all such with considerable cavities. By disease of slight severity is to be understood: disseminated foci manifested by slight dullness, unclear, rough or weak vesicular, vesico-bronchial, or broncho-vesicular breathing and fine and medium râles. By severe disease: compact infiltration recognized by great dullness, very weak (indeterminate) broncho-vesicular, or bronchial indefinite breathing, with or without râles. Considerable cavities to be recognized by tympanitic sound, amphoric breathing, and extensive coarse consonating râles, come under Group (3).

THE RECORDS OF KING EDWARD VII SANATORIUM.

The data reviewed in this paper consist of the records of 1,082 patients, who were discharged during the period July 1, 1907, to July 1, 1911 (I have omitted the year 1906-1907, as during a part of this, the first year, the work of the Sanatorium was not completely organized). The after-histories of these 1,082 patients, then, cover a period ranging from a maximum of five years and months to a minimum of sixteen months subsequent to their discharge from the Sanatorium—a long enough period to give the returns a distinct value.

DIAGNOSIS.

(1) These 1,082 patients were all sent in by medical practitioners, as definite cases of pulmonary tuberculosis. The diagnosis was not confirmed by ourselves in fifty-two cases, or 4·8 per cent. of the total admissions; in fact, to be more explicit, we definitely excluded pulmonary tuberculosis in fifty-two cases. These cases are of course excluded from our annual returns. The after-histories of these fifty-two patients favour the correctness of our opinion. Not one of them as yet has shown any sign or symptom of pulmonary tuberculosis. There have been three deaths from malignant disease of mediastinum, cancer of larynx, and appendicitis respectively. That nearly 5 per cent. of patients sent in as pulmonary tuberculosis were not suffering from the disease is evidence of the difficulty of diagnosis. It is proof that the practitioner sometimes errs on the side of safety, and proof also that those are justified who are sceptical of a positive diagnosis on paper, in the absence of tubercle bacilli. It would be interesting to know the experience of dispensaries on this point.

(2) The next feature of interest concerning diagnosis is, that of the 1,030 cases in which the diagnosis was confirmed by ourselves, we found the tubercle bacillus in 82·4 per cent., leaving 17·5 per cent. of cases in whom the positive diagnosis was not thus confirmed. Compared with dispensary work, I imagine the figure of 82·4 per cent. of cases with tubercle bacilli is a high one—e.g., in the *Lancet* of October 5, 1912, Dr. Fairley states that of 244 cases of pulmonary tuberculosis at that date attending the dispensary at Portsmouth, tubercle bacilli had been found in 39·4 per cent. only. I should add that the sputum examinations at the Sanatorium are made with great care.

Our data, then, consist of 1,030 cases diagnosed as pulmonary tuberculosis, of which 82·4 per cent. had tubercle bacilli in the sputum and 17·5 per cent. had no tubercle bacilli so far as we could determine. Of this number, 110 have been lost sight of (a good many of these have been traced up to last year), and the remaining 920 have been traced up till the present date. To simplify matters, I shall not take into account these 110 patients who have been lost sight of, but deal only with the 920 whose after-histories are complete. This total of 920 patients is divided into two main classes:—

(1) Those in whom tubercle bacilli were found—764 in number.

(2) Those in whom bacilli were not found—156 in number.

Considering first the 764 cases in whom tubercle bacilli were found. Of this number 57·1 per cent. are known to be well or alive, and 42·8 per cent. are known to be dead. If we divide these 764 cases into the customary three groups: (1) early, (2) moderately advanced, (3) advanced, the following is the result: Of 183 cases in Group I (153), 83·6 per cent. are well or alive; (30), 16·3 per cent. are dead. Of 357 cases in Group II (220), 61·6 per cent. are well or alive; (137), 38·3 per cent. are dead. Of 224 cases in Group III (64), 28·5 per cent. are well or alive; (160), 71·4 per cent. are dead.

The records of the cases in whom no tubercle bacilli were found are very different reading. Of the 156 in this group, 89·1 per cent. are well or alive, and 10·9 per cent. are dead. Two of the deaths were due to tuberculous meningitis. Of these 156 patients, 18 per cent. have, since their discharge, again shown symptoms of pulmonary tuberculosis

To summarize these records of the 920 patients. Their condition at the present time, after a lapse of from a minimum of one year four months to a maximum of five years four months, since discharge, is as follows:—

(*a*) Those in whom no tubercle bacilli were found (156), 89·1 per cent. are well or alive, 10·9 per cent. are dead.

(*b*) Those in whom tubercle bacilli were found (764): Group I (183), 83·6 per cent. well or alive, 16·3 per cent. dead; Group II (357), 61·6 per cent. well or alive, 38·3 per cent. dead; Group III (224), 28·5 per cent. well or alive, 71·4 per cent. dead.

Such are the bald facts. They represent the degree of success which has attended the work of the Sanatorium up till July, 1911, as judged by the only reliable test, the test of time. To comment briefly on these data:—

(*a*) The very favourable results obtained in the patients without tubercle bacilli is noticeable. The exact significance of the figures depends on our attitude towards patients without tubercle bacilli. Are we justified in holding that these cases have been rescued from tuberculosis by the treatment they received, or is it that a large number of them were no worse than many who receive no treatment at all and get well? That they all had evidence of pulmonary tuberculosis I had no doubt, nor had my colleagues, but I must confess to an inability to differentiate with any certainty, in many instances, between a recent and quiescent focus of disease and a lesion that is probably obsolete and of no clinical significance. It is only natural, perhaps, that I should lean to the view that a considerable number of these patients have been cured of incipient disease. It is clear, however, that, granted the correctness of the diagnosis, this class of case is very amenable to cure, and does not furnish at all a severe test to any therapeutic measure.

(*b*) When we come to consider the 764 patients, all of whom had tubercle bacilli, we are on surer ground. There can be no possible doubt as to the existence of the disease. The records of 183 early cases (Group I) with tubercle bacilli present, showing 16·3 per cent. of deaths and 83·6 per cent. well or alive, compares very favourably indeed with the records of the class just considered, in which no tubercle bacilli were ever found. The difference amounts only to some 5 per cent. more deaths and some 5 per cent. fewer "well or alive." The physical signs and symptoms were very similar in both sets of patients. Other things being equal, then, the presence of tubercle bacilli has a somewhat unfavourable significance. None the less, the average patient with early disease and with tubercle bacilli present does well under sanatorium treatment. Many cases of this nature doubtless get well without anything more active in the way of treatment than their removal from an unfavourable environment, a method of cure which sanatoria accomplish very effectually. There can be no doubt, too, as to the value to the patients of the practical lessons in hygienic living, as taught in well-managed sanatoria. Education and cure go hand in hand.

Group III, including 224 cases of markedly advanced disease, calls for little or no comment, except, perhaps, on the score that these advanced cases continue to form a considerable proportion of admissions to sanatoria; 28·5 per cent. well or alive after some years represents a measure of success, some prolongation of life and a few apparently complete recoveries; but the mortality of 71·4 per cent. shows how little permanent benefit is to be expected from sanatoria in this class of case.

I have left Group II to the last, as being the most interesting. The type of case falling into this group is the one most commonly met with.

No longer a case of early and very limited disease, a patient of this kind with, perhaps, two or three lobes affected, usually still retains unimpaired his general condition and recuperative power. If only the onward march of the lung disease can be stayed and arrested, complete restoration to health and capacity for work is still to be looked for with confidence. Failing efficient arrest, the lapse into a hopeless condition is inevitable.

It is this type of pronounced, but still recoverable disease that provides the best test for any method of treatment. The bacillus-free case and the very early case, even with tubercle bacilli present, may get well without any treatment, and probably often do so. Spontaneous cure, however, in a patient in whom the disease has obtained a good hold, cannot be common. Sanatorium treatment alone, as shown by our figures, does not do all we could wish for in these cases. A mortality of 38 per cent. in so short a period as one and a quarter years to five and a quarter years is unpleasantly high, even if 61 per cent. well or alive after a like interval gives us some substantial measure of encouragement. To judge by other after-histories which I have followed up for ten years or more, we may expect a mortality of some 50 per cent. in this group at the end of seven years, subsequent to discharge, after which the rate of mortality should drop considerably. It is this type, the type which represents the average consumptive, that requires something more than sanatoria can give.

THE SIGNIFICANCE OF THE DISAPPEARANCE OF TUBERCLE BACILLI FROM THE SPUTUM.

There is nothing fresh in the observation that patients who lose their tubercle bacilli as the result of treatment have a more favourable outlook than those who, though immensely improved, do not lose them. None the less, the results of our observations on this particular point are more striking than we had expected.

Of the 764 patients who, on admission to the sanatorium, had tubercle bacilli in their sputum, 158 only, or 20·6 per cent., lost them before discharge. The small proportion of patients who lose their tubercle bacilli after an average of some four months' sanatorium treatment is significant. It means that but few, apart from the very early cases, can hope to leave a sanatorium apparently cured. It is to the patient's interest that he knows this.

What it means to the consumptive to lose his bacilli is shown by the after-histories of the 158 patients who were fortunate enough to do so; of 158 patients who lost their tubercle bacilli before discharge, 84·1 per cent. are well or alive, and 15·8 are dead.

As a comparison, the following are the after-history records of the remaining 606 patients who did not lose their bacilli. Of 606 patients discharged with tubercle bacilli still present, 50·1 per cent. are well or alive, and 49·8 per cent. are dead.

It is very encouraging also to note that the patients with well-marked disease (included in Group II) who lose their tubercle bacilli have quite as good a prognosis as the slight cases (Group I) who lose their bacilli. Our records in this respect are as follow: Of 79 cases in Group I who lost their tubercle bacilli, 87·3 per cent. are well or alive, and of 64 cases in Group II who lost their bacilli, no less than 90·6 per cent. are well or alive. Only a few cases of very advanced disease lost their tubercle bacilli; but of these, fifteen in number, 40 per cent. are in fair or good health at the present time.

The disappearance of tubercle bacilli from the sputum is, then, a factor of the highest importance, from the point of view of individual prognosis; and, in the interest of the public health, the advantage of having sputum cleared of bacilli is obviously very great. In the treatment of pulmonary tuberculosis this should be our aim; we should be satisfied with nothing less. Further, to judge by our results, we have, in the persistence of, or in the disappearance of, tubercle bacilli, evidence of the greatest significance as to the value of any method of treatment.

In the opinion of some physicians, notably Loewenstein, Bandelier and Roepke, and Curschmann, the combination of sanatorium treatment with tuberculin treatment is very much more effective in clearing the sputum of tubercle bacilli than sanatorium treatment alone. This statement, coming as it does from experienced observers, carries considerable weight, and in itself calls for a thorough and systematic trial of tuberculin in sanatoria. The confirmation of these observations is clearly a matter of the very highest importance.

CONCLUSIONS.

In making this survey, I have tended, perhaps, somewhat to belittle the value of sanatoria, in that I have dwelt more upon what they fail to do than on what they actually accomplish. My object has been to indicate in what directions we may look for material improvement in the future, as compared with the past, if tuberculin is indeed a potent additional factor for good. What we hope to find in the near future is that a higher proportion of patients is being discharged free of tubercle bacilli, and later on that the mortality year by year is sensibly falling. Our record for "tubercle bacilli not found" cases of 89·1 per cent. well or alive after some years cannot be very much improved upon, but the record for early cases of 83·6 per cent. well or alive gives some scope for improvement. However, it is the results obtained in the treatment of the somewhat more advanced cases, the big class classified in Group II by most sanatorium physicians, to which we chiefly look for the information we are seeking as to the value of tuberculin.

There is one other point which is pertinent to my subject. Supposing that dispensaries prove the truth of the contention, that with the aid of tuberculin early cases of pulmonary tuberculosis can be as certainly benefited in their own homes or whilst at their work as by sanatorium treatment, sanatoria will have seriously to consider the advisability of refusing to admit the very cases which, at present, they endeavour to admit to the exclusion of all others. This sounds very revolutionary. Still it is logical enough, granted the truth of the premises. Sanatoria could then be devoted to the less favourable cases, for whom, as I have previously noted, something more is required; longer treatment certainly.

An increasing number of dispensaries will, ere long, be contributing their quota of evidence on this very important subject. It is earnestly to be hoped that the records of these institutions will be kept and published upon some common basis, that particular note be made as to the presence or absence of tubercle bacilli in the cases of pulmonary tuberculosis treated, and that every effort be made systematically to obtain after-histories. The value of tuberculin as an addition to sanatorium treatment is a question which falls to the lot of King Edward VII Sanatorium and similar institutions. Our answer is now in the making.

I add as an appendix, detailed records of the patients dealt with, set out in the German method, showing all the after-history results in successive years. For the classifying of ultimate results, the German method is the only one which is entirely satisfactory.

TABLE I.—THE CONDITION IN EACH SUCCESSIVE YEAR, SUBSEQUENT TO THEIR DISCHARGE, OF 1,030 PATIENTS DIAGNOSED AS PULMONARY TUBERCULOSIS, OF WHOM 849 HAD TUBERCLE BACILLI IN THEIR SPUTUM AND 181 HAD NOT.

Group I.

Year of discharge	Number discharged	NUMBER WELL OR ALIVE IN EACH SUCCESSIVE YEAR AFTER DISCHARGE				Number dead in 1912	Number lost sight of in 1912
		1909	1910	1911	1912		
1907-08	79	72	71	65	54	13	12
1908-09	72	—	68	56	50	11	11
1909-10	90	—	—	83	72	9	9
1910-11	89	—	—	—	76	4	9

Group II.

1907-08	108	86	75	69	57	36	15
1908-09	122	—	104	76	59	45	18
1909-10	111	—	—	80	69	32	10
1910-11	115	—	—	—	72	34	9

Group III.

1907-08	70	38	29	23	19	48	3
1908-09	84	—	41	31	20	59	5
1909-10	50	—	—	27	16	30	4
1910-11	40	—	—	—	12	23	5

All Cases considered together.

1907-08	257	196	175	157	130	97	30
1908-09	278	—	213	163	129	115	34
1909-10	251	—	—	190	157	71	23
1910-11	244	—	—	—	160	61	23

TABLE II.—THE CONDITION IN EACH SUCCESSIVE YEAR, SUBSEQUENT TO THEIR DISCHARGE, OF 181 PATIENTS DIAGNOSED AS PULMONARY TUBERCULOSIS IN WHOSE SPUTUM TUBERCLE BACILLI WERE NEVER FOUND.

Group I.

Year of discharge	Number discharged	NUMBER WELL OR ALIVE IN EACH SUCCESSIVE YEAR AFTER DISCHARGE				Number dead in 1912	Number lost sight of in 1912
		1909	1910	1911	1912		
1907-08	28	28	28	27	21	1	6
1908-09	30	—	29	22	21	3	6
1909-10	34	—	—	33	30	2	2
1910-11	30	—	—	—	27	1	2

Group II.

1907-08	17	16	11	14	13	3	1
1908-09	21	—	19	15	11	5	5
1909-10	11	—	—	9	8	2	1
1910-11	6	—	—	—	5	0	1

Group III.

1907-08	2	2	2	2	2	—	—
1908-09	0	—	—	—	—	—	—
1909-10	2	—	—	2	1	—	1
1910-11	0	—	—	—	—	—	—

All Cases considered together.

1907-08	47	46	41	43	36	4	7
1908-09	51	—	48	37	32	8	11
1909-10	44	—	—	44	39	4	4
1910-11	36	—	—	—	32	1	3

TABLE III.—THE CONDITION IN EACH SUCCESSIVE YEAR, SUBSEQUENT TO THEIR DISCHARGE, OF 849 PATIENTS WHO ON ADMISSION HAD TUBERCLE BACILLI IN THEIR SPUTUM.

Year of discharge	Number discharged	NUMBER WELL OR ALIVE IN EACH SUCCESSIVE YEAR AFTER DISCHARGE				Number dead in 1912	Number lost sight of in 1912
		1909	1910	1911	1912		
			Group I.				
1907-08	51	44	43	38	33	12	6
1908-09	42	—	39	34	29	8	5
1909-10	56	—	—	50	42	7	7
1910-11	59	—	—	—	49	3	7
			Group II.				
1907-08	91	70	61	55	44	33	14
1908-09	101	—	85	61	48	40	13
1909-10	100	—	—	71	61	30	9
1910-11	109	—	—	—	67	54	8
			Group III.				
1907-08	68	36	27	21	17	48	3
1908-09	84	—	41	31	20	59	5
1909-10	48	—	—	25	15	30	3
1910-11	40	—	—	—	12	23	5
			All Cases considered together.				
1907-08	210	150	131	114	94	93	23
1908-09	227	—	165	126	97	107	23
1909-10	204	—	—	146	118	67	19
1910-11	208	—	—	—	128	60	20

TABLE IV.—THE CONDITION IN EACH SUCCESSIVE YEAR, SUBSEQUENT TO THEIR DISCHARGE, OF 178 PATIENTS ADMITTED WITH TUBERCLE BACILLI IN THEIR SPUTUM, AND DISCHARGED WITH SPUTUM FREE OF BACILLI.

Year of discharge	Number discharged	NUMBER WELL OR ALIVE IN EACH SUCCESSIVE YEAR AFTER DISCHARGE				Number dead in 1912	Number lost sight of in 1912
		1909	1910	1911	1912		
			Group I.				
1907-08	20	18	17	15	14	6	—
1908-09	24	—	24	21	18	2	4
1909-10	24	—	—	22	18	2	4
1910-11	22	—	—	—	19	—	3
			Group II.				
1907-08	13	12	11	10	10	2	1
1908-09	22	—	21	17	14	4	4
1909-10	18	—	—	18	17	—	1
1910-11	18	—	—	—	17	—	1
			Group III.				
1907-08	12	7	5	4	4	8	—
1908-09	4	—	3	3	2	1	1
1909-10	—	—	—	—	—	—	—
1910-11	1	—	—	—	—	—	1
			All Cases considered together.				
1907-08	45	37	33	29	28	16	1
1908-09	50	—	48	41	34	7	9
1909-10	42	—	—	40	35	2	5
1910-11	41	—	—	—	36	—	5

TABLE V.—THE CONDITION IN EACH SUCCESSIVE YEAR, SUBSEQUENT TO THEIR DISCHARGE, OF 671 PATIENTS ADMITTED WITH TUBERCLE BACILLI IN THEIR SPUTUM, AND DISCHARGED WITH TUBERCLE BACILLI STILL IN THEIR SPUTUM.

Group I.

Year of discharge	Number discharged	NUMBER WELL OR ALIVE IN EACH SUCCESSIVE YEAR AFTER DISCHARGE				Number dead in 1912	Number lost sight of in 1912
		1909	1910	1911	1912		
1907-08	31	26	26	23	19	6	6
1908-09	18	—	15	13	11	6	1
1909-10	32	—	—	28	24	5	3
1910-11	37	—	—	—	30	3	4

Group II.

1907-08	78	58	50	45	34	31	13
1908-09	79	—	64	44	34	36	9
1909-10	82	—	—	53	44	30	8
1910-11	91	—	—	—	50	34	7

Group III.

1907-08	56	29	22	17	13	40	3
1908-09	80	—	38	28	18	58	4
1909-10	48	—	—	25	15	30	3
1910-11	39	—	—	—	12	23	4

All Cases considered together.

1907-08	165	113	98	85	66	77	22
1908-09	177	—	117	85	63	100	14
1909-10	162	—	—	106	83	65	14
1910-11	167	—	—	—	92	60	15

DISCUSSION.

Dr. HORTON-SMITH HARTLEY said the Section was much indebted to Dr. Bardswell for bringing this valuable paper forward, in which he had made several excellent points. One of the most important was his division of cases into those which had the tubercle bacillus in the sputum and those which had not. Such a classification should be made in compiling any statistics of this nature, because otherwise many who looked at such figures would have at the back of their minds a lingering doubt as to how many of the cases were really phthisis. In the statistics which would be rendered by sanatoria and dispensaries in the future he hoped this plan would be generally adopted. When the paper was published he hoped Dr. Bardswell would give an idea as to how the diagnosis was arrived at when no bacilli were found. He thought himself that if a patient came with wasting, cough, sputum, and physical signs—though perhaps slight—and the subcutaneous injection of tuberculin produced, in addition to a general reaction, focal signs, such as increased cough and phlegm, pain in the chest, or an accentuation of physical signs, there could be but little criticism of the diagnosis in such a case, even in the absence of bacilli in the sputum. The author recorded the large proportion of 82 per cent. of the cases as showing bacilli in the sputum—a very excellent result—and he would like to ask what method was used to find the bacilli, whether examination in the ordinary way of the early morning sputum, or some such intensive method as the antiformin. Similar information would also be of great value in regard to the 148 cases—patients who lost their tubercle bacilli before leaving the sanatorium. One hundred and twelve cases were said to have been lost sight of. One knew well the great difficulty of tracing hospital patients, but at that great institution in New York State, the Adirondack Cottage Sanitarium, at Saranac Lake, during a course of twenty-six years, they had succeeded in tracing, if he remembered aright, all but about ninety. He did not think one should have to admit that at the end of five years 112 cases had been lost sight of. Another criticism which he ventured to make was, that Dr. Bardswell grouped the cases all together, and gave the results *en masse* at the end of five years; he thought it would be better if, in addition, he could give the number of cases treated each year, and their condition in each succeeding year, as was commonly done in statistics of this kind. At present it was open to any hostile critic to say that the bulk of the cases were admitted in the last year of the five, thus entirely vitiating the statistics. He was sure everybody would be indebted to Dr. Bardswell for his figures, which could not fail to be of great value, especially as they would later on form a standard by which it would be possible to compare the results obtained in those who, in addition to treatment on ordinary sanatorium lines, had also received treatment by tuberculin.

Dr. T. D. ACLAND remarked that it was difficult to discuss statistics, but he would make one or two suggestions, because he hoped the figures would constitute valuable scientific data on which to form opinions. There had been so many inaccurate statements, that it was necessary to get such figures as Dr. Bardswell and his colleagues could supply in order to have trustworthy evidence. He was not quite sure that it was a fair test to take the presence or absence of tubercle bacilli in the sputum as the essential proof of pulmonary tubercle, because there were many cases, such as those of miliary tuberculosis, in which there was no sputum for examination. What he would like to see, and he supposed one would know eventually, was the relationship of the complement-fixation test and the cutaneous reaction to the presence of the tubercle bacillus. He had a case now under care in which, though the sputum was teeming with bacilli, the Wassermann reaction or complement-fixation test was absent. He hoped Dr. Radcliffe and Dr. Bardswell would pay some attention to this point, because it would probably furnish additional evidence as to whether doubtful cases were or were not tuberculous, and probably it would show that cases not previously included as tuberculous ought to have been. Dr. Bardswell had raised a bogy, which he hoped it would be possible to lay—namely, that the early cases, i.e., those in which the prospects of recovery were best, would not get into the sanatoria. It would take a great deal to convince him that a patient with the disease should be left in unhealthy surroundings rather than taken away from them, and put into the healthy conditions of a sanatorium. To cease to take that measure he thought would be disastrous to the patients themselves.

Dr. CECIL WALL said that, in taking such a series of figures as this, one felt that there were so many variables which might contribute to the result that one could not be quite certain as to the value of the tables. For instance, there was nothing in these tables which gave an idea of the expectation of life of persons of similar ages apart from tuberculosis. How many persons would have been dead in the ordinary course, apart from that disease? One should draw attention, in some way, to the fact that in the ordinary course some of the patients might have died from conditions other than tuberculosis. And the ages of the patients should be given, because, of course, the older the person the less was his expectation of life. Again, nothing was included to show the length of the stay of patients in the sanatorium. For family and other reasons patients in some cases had to leave before the completion of the treatment, and then it was scarcely fair to the statistics of the sanatorium to include them: if they were included, some note should be made to that effect. The final table which he asked Dr. Bardswell to include would not be very difficult to draw up: it was one which Dr. Pollock included in his book on tuberculosis, and it seemed to be one of the simplest methods of testing any form of treatment. He referred to the effort to discover the duration of the disease from the first onset of symptoms. There should be three groups of cases: (1) Those known to have ended fatally, giving the duration of the disease; (2) those remaining well, giving the duration of the disease up to the last report; (3) those who were ill, with the duration of the disease up to the last report. Such information would be of extreme value when comparing results by various treatments. His other criticism would concern the method of grouping adopted. He considered that the anatomical classification of cases of pulmonary tuberculosis had been one of the chief stumbling-blocks in any attempt at testing methods of treatment. Those who had worked at the disease knew that it mattered very little, in many cases, what was the actual extent of the disease; what was important was the symptoms and their intensity. He would be glad if Dr. Bardswell would give some idea of the physiological classification, in addition to the anatomical—i.e., could he adopt Dr. Inman's suggestion and give: (1) the ambulant afebrile; (2) ambulant febrile, resting afebrile; (3) resting febrile? If it were known into which of these groups patients naturally fell on admission, such information would be of very great value, and would add to the importance of the work being done at Midhurst.

Dr. F. PARKES WEBER said he wished to add a word as to the criterion adopted by Dr. Bardswell for the diagnosis of pulmonary tuberculosis. He felt strongly that the author had adopted what, for responsible statistical purposes, was the only permissible criterion—i.e., the presence of tubercle bacilli in the sputum. Otherwise, as was often the case, one got into all kinds of difficulties. A certain large number of persons were going about with some quiescent tuberculosis in the body, but they were not tuberculous *patients*, and many of them would probably never become such Many of those persons temporarily got "run down" from an unhealthy mode of life; they developed dyspeptic symptoms and then went to a doctor, who, applying the modern tests, would declare they had tuberculosis, and would, perhaps, make them think that the tuberculosis was the cause of their temporary symptoms. If such cases were classed as cases of active tuberculosis whenever the modern tests proved positive, many difficulties would arise. He admitted that if, as the result of the doctor's modern laboratory methods of testing, the patient were sent to a sanatorium for a time, the result to the patient would probably be good. But from the statistical and scientific point of view, and that concerning the progress of medical knowledge, the effect of such wholesale inclusion would be most misleading. For clinical purposes and treatment of individual cases, one should endeavour to diagnose the existence of pulmonary tuberculosis by the physical signs (by percussion, auscultation, &c.), as of old. These physical signs, strengthened, perhaps, by the results of modern Röntgen-ray examination, enabled one sometimes (for purposes of immediate treatment, but not for statistical purposes) to make a positive diagnosis of the presence of active pulmonary tuberculosis, in spite of persistent absence of tubercle bacilli from the sputum or in spite of the absence of any sputum to test.

Dr. McCULLOCH said it had occurred to him, as it seemed to have occurred to Dr. Parkes Weber, that the fact of there being "tubercle carriers" in otherwise normal persons made it extremely difficult definitely to express an opinion on the criterion taken by Dr. Bardswell—namely, the presence or absence of tubercle bacilli in the sputum. The sputum was often unavoidably swallowed. It was admitted that 90 per cent. of the population were thus more or less tuberculized. They also carried a variety of other micro-organisms of a potentially pathogenic and non-pathogenic kind, but to which there was, for certain less understood reasons, no apparent reactive response by the cellular mechanisms of the host. This fact resolved itself, to his mind, in an important racial revolutionary problem. With regard to the author's observation of there being something lacking in sanatorium treatment, he (the speaker) had lived for twelve years continuously in the temperate zone of the north-western Himalayas in his professional capacity. The atmospheric conditions were those most eminently suitable for sanatoria, the rainfall being practically *nil.* Tuberculosis was extremely rare among the mountaineers, even after long contact with white travellers at those high altitudes—6,000 to 10,000 ft. These conditions were not to be found in the British Isles. Segregation and better environment were secured, apart from which advantages he considered sanatoria a waste of money. With regard to Röntgen rays for diagnostic purposes, he could not agree with Dr. Parkes Weber that in the early acute stages it was at all helpful, although it was, he believed, now, a routine practice in Germany. He had, however, treated the apyrexial type of tuberculosis with lymphatic glandular involvement, assuming this to be present in those cases where they were not obviously manifest. The treatment was directed solely to the glands or glandular regions. He contributed a paper to the *Lancet* in 1907,[1] entitled "Observations on the Induction of Auto-vaccination in Tuberculosis and other Chronic Glandular Infections by the X-rays (as revealed by the opsonic chart of the former)." Those observations and experiments were repeated and confirmed in America by Dr. Lawrence as well as by Dr. Crane independently. They had not been repeated in this country. Herr von Baisch published a large number of similar results in the *Berliner klinische Wochenschrift*, October 30, 1911,[2] also confirmatory of his observations. Signori Paoli and Nuncioni, in Italy, had confirmed them in regard to syphilitic adenitis. He therefore directed attention to the study of lymphatic gland evolvement in infectious diseases and to an interpretation of their true significance. Very little was known of the anatomy or physiology of the lymphoid and lymphatic mechanisms, and radio-biology was still in its infancy, but these investigations were full of promise. The phenomena that required to be correlated he would state in the following order: (1) Microbic stimulus; (2) gland proliferative response; (3) leucocytosis; (4) phagocytosis; (5) re-entry of phagocytes from the epithelial surface into the lymphatic ducts, as sometimes evidenced by lymphangitis; (6) cytolysis and propulsion of phagocytic products to the particular gland hilus; (7) sensitization of the germinal matrix of gland in view of succeeding generations of leucocytes; (8) immunity. Thus the presence of pigment particles or various conditions of microbes could be scientifically accounted for in the glands, and not by their inherent mobility, or by the lymph or the blood flow.

[1] *Lancet*, 1907, i, pp. 215-18.

[2] *Berl. klin. Wochenschr.*, 1911, xlviii, p. 1968.

The PRESIDENT (Dr. Frederick Taylor) asked whether it would be possible to compare the present sanatorium treatment with the treatment on the old lines thirty years ago, at which date, no doubt, consumptive patients did recover occasionally, just as the milder cases did now. It would be instructive if information could be obtained as to how long people lived on the simple treatment of being removed from their homes in the slums of London, and placed in well-ventilated hospital wards, and being fed on the kind of food to which they had long been strangers. No doubt hundreds of patients had as a result of that a diminution of sputum and fever, and an improvement in their physical signs. And the benefit was probably still more marked in the case of private patients who could afford to go for a long sea voyage or to Switzerland.

Dr. BARDSWELL, in reply, thanked the Fellows who had spoken for their observations and criticisms. To take various points raised by them *seriatim*: *Re* examination of sputum: Great care is exercised at the sanatorium in this respect. The first sputum coughed up on waking is taken. Film preparations are made from this in the ordinary way, and should this method give a negative result, the sedimentation method of Ellermann and Erlandsen is used. *Re* the question of diagnosis: Dr. Bardswell agreed that there are many undoubted cases of pulmonary tuberculosis in whose sputum no tubercle bacilli can be found. However, for statistical purposes, dealing with results of treatment, one must draw the line somewhere, and with our present knowledge there was nothing for it but to divide patients into two classes—namely, those with tubercle bacilli and those without tubercle bacilli. To do otherwise was to open the door to all manner of inaccuracy and doubt as to the value of records as representing what can be done for pulmonary tuberculosis. At King Edward VII Sanatorium the patients in whose sputum no tubercle bacilli are found are examined systematically by the more modern methods. In the first place, the opsonic index is taken on rest and immediately after exercise. The complement-fixation test is next tried, and after this the subcutaneous tuberculin test. If all these tests give a negative result, the patient under observation is discharged. Not infrequently, however, the information given by these various tests is inconclusive. It must be remembered that this work is as yet in its experimental stages. Speaking generally, the practice at the Sanatorium in respect to those who have no tubercle bacilli is to retain in the sanatorium for treatment only those who give a focal reaction in the lungs following subcutaneous injections with tuberculin. The records of these particular patients will be considered in a separate group in subsequent annual reports, instead of being included with the records of patients in whom the diagnosis was confirmed by the finding of tubercle bacilli in the sputum. With regard to the comments as to the proportion of patients who are lost sight of after discharge, Dr Bardswell considered that the loss of 110 patients out of a total number of 1,082 was by no means unsatisfactory, in view of the great difficulty of tracing discharged patients year by year. The great difficulty lies in tracing patients, especially those living in large cities, who move from house to house, often leaving no address. It is also very difficult after a time to trace patients who emigrate, as not infrequently they move from one colony to another. Dr. Hartley referred to the very complete statistics published by Dr. Lawrason Brown, of the Adirondack Sanitarium in America. Dr. Bardswell stated that he was sufficiently struck by these statistics to ask Dr. L. Brown how he managed to secure such a complete record of after-histories. Dr. Brown's reply was, that having exhausted all ordinary means of tracing patients by the post, &c., he employed a whole-time clerk, and paid him a bonus for every lost patient he brought to light. This method has much to commend it, although it is a somewhat expensive one.

The Occurrence of Acute Pneumonia during Treatment with Arsenic.

By F. Parkes Weber, M.D.

In a few cases I have observed the sudden occurrence of pneumonia in children whilst they were undergoing arsenical therapy on account of lymphadenoma or some other disease, and it has appeared to me that the association was no chance one, but that the pneumonia was in some way dependent on the taking of arsenic, like arsenical herpes zoster is. Two of the patients likewise had attacks of arsenical herpes zoster. The rapid recovery from the lung disease was another striking feature.

The first case was that of a girl, S. T., aged 15, under my care at the German Hospital in 1902 for lymphadenoma. The patient was thin and anæmic, and the lymphatic glands on the right side of the neck and the spleen were greatly enlarged. Enlarged cervical glands had been already present in 1898. In June, 1902, whilst under arsenical treatment she had a short acute attack of pneumonia at the base of the left lung, accompanied by very little fever. It may be noted that about a year previously (1901), whilst taking arsenic she had had a mild attack of herpes zoster (doubtless arsenical herpes zoster) on the left side of the chest, though in regard to her general condition the arsenic seemed to have done her good. The herpes zoster apparently caused her no pain or inconvenience. She died in December, 1902, and the necropsy showed the presence of considerable (partly miliary) tuberculosis in addition to old lymphadenoma. The spleen was enlarged to about five times the normal size and contained whitish masses. Microscopically, the spleen, and the liver also, were found to contain minute tubercles. A hard, fibrous mass, situated at the back of the upper part of the abdomen and displacing the stomach and liver forwards, had microscopically the appearance of chronic hard lymphadenoma.

The second case (1902) was that of a boy, R. S., aged 8, suffering from typical Hodgkin's disease (lymphadenoma), which involved the cervical lymphatic glands and the spleen. He was under the care of my colleague Dr. Karl Fürth, who has kindly allowed me to refer to the case. The disease, which was supposed to have commenced about three years ago, was apparently diminishing under arsenical treatment, when, in December, 1902, he developed signs of pneumonia (dullness and bronchial breathing at the base of the left lung), accompanied by only slight fever. The arsenic was discontinued. The boy had likewise typical herpes zoster on the right side of the chest, and a generalized eruption of minute vesicles on the trunk, possibly due to arsenic. This was followed by a good deal of desquamation, especially on the palms of the hands (? arsenical). The boy seemed fairly well when he left the hospital in January, 1903. But he did not live long.

The third case was that of a boy, F. J., aged 7½, admitted under my care in June, 1905, for chorea minor. The case had a special interest of its own inasmuch as the patient was left-handed and the right half of his head was distinctly bigger than the left half; the choreic trouble, which was specially marked in his left upper extremity, was temporarily associated with loss of speech ("choreic aphasia"). Auscultation of the heart showed a slight mitral systolic murmur when he left the hospital in September, 1905. In the following year he was readmitted for slight chorea, and whilst under arsenical treatment, on March 6, 1906, he developed pneumonia of the lower part of the left lung (impairment of resonance and crepitation) with considerable fever. There was no fever after March 13, but crepitation could be heard over the affected lung for some days more. The pneumonia seemed to be of a mild type. There was very little cough and no pain.

The fourth case (1910) was that of a little girl, A. G., aged 4, who, when being treated with liquor arsenicalis for a lichen-like affection, developed acute pneumonia (with dullness and bronchial breathing) at the base of both lungs. There was considerable fever, but the pneumonic signs cleared up very well. There was for a time in this case a diffuse cutaneous erythema, which may have been of arsenical origin, and was followed by slight general desquamation and brownish pigmentation.

The fifth case was that of a girl, T. E., aged 14, who was undergoing radium treatment, and was taking arsenic and iron for an acute and malignant type of Hodgkin's disease (lymphadenoma). A lymphatic glandular swelling had been first noticed on the left side of the neck in January, 1912, and after operative removal of this in May, 1912, a fresh glandular tumour had rapidly formed on the same side of the neck. Radium treatment was then tried (August), and was followed by great diminution of the swelling in the neck, but soon afterwards a striking enlargement of the spleen, and probably of intra-abdominal lymphatic glands also, occurred. She was losing ground in spite of treatment by arsenic and iron and the radium therapy, when, on December 5, 1912, I saw her with Dr. Smulian for acute lobar pneumonia of the lower part of the left lung (dullness, bronchial breathing, and some crepitation), with moderate fever. Respiration 46 per minute, pulse 120 per minute. The pneumonia had apparently commenced with convulsions three days previously, and it seemed (considering the patient's bad general condition) to have come as a "terminal" infection. However, on the next day the patient was already recovering from the pneumonia, and in a few days she was able to leave her room and go out for drives. The lymphadenomatous disease, nevertheless, rapidly progressed, and she soon died.

In the foregoing cases the patients were all young and the recovery from the pneumonia was excellent, even when the general condition, as in the last case, was extremely bad. There was little in the way of distressing cough or pain. It seems to me that arsenic may possibly predispose some persons to an attack of (pneumococcal?) pneumonia, just as it is acknowledged to predispose some individuals to an attack of herpes zoster, which is, perhaps, like pneumonia, a disease of infectious (microbic) origin. On the other hand, my cases are too few in number to draw any certain conclusions from, and I do not know of any similar cases having been described in the literature on the effects of arsenic or in that on pneumonia. It must not, however, be forgotten that it is only comparatively recently that herpes zoster has been acknowledged to be, in some cases, a consequence of the ingestion of arsenic as a medicine or otherwise (for instance, as a contamination of beer in the English epidemic of arsenical poisoning in the year 1900 amongst beer-drinkers).

I think it highly probable that cases of pneumonia similar to those which I have recorded will soon be observed by others amongst children and young persons undergoing arsenical treatment. If other cases should be found to confirm my suggestions, I would be tempted to think that the arsenic, whilst predisposing towards pneumonia, must also exert a favourable effect on the reaction of the body towards the disease, that is to say, that when pneumonia (pneumococcal) occurs in patients who are being treated with arsenic, the pneumococcal infection is quickly and successfully resisted. Perhaps, later on, some arsenical drug, like salvarsan or neo-salvarsan, will be found to have a beneficial effect in pneumococcal pneumonia, or other pneumococcal infections, and perhaps it would be worth while undertaking experiments with mice or rabbits in this connexion; that is to say, one might try the effect of arsenical preparations, in regard to experimental pneumococcal pneumonia, in mice and rabbits.

DISCUSSION.

Dr. HINGSTON FOX said it would be difficult to draw conclusions on this subject without having considerably more data than Dr. Parkes Weber had presented. Hutchinson's observations, long ago, on the occurrence of herpes during the administration of arsenic and the frequent association of herpes with pneumonia, afforded a suggestion that the causation of the two might be allied. He did not gather that Dr. Weber had any definite theory as to the way in which arsenic predisposed to pneumonia.

Dr. ROBERT HUTCHISON said that, assuming that arsenic did predispose to pneumonia, it was difficult to see how it could also enable the patient to withstand it, as suggested by Dr. Weber. That seemed a contradiction in terms.

Dr. VOELCKER pointed out that many of the cases mentioned by Dr. Weber had been instances of lymphadenoma, and he supposed it was within everybody's experience that in cases of lymphadenoma pneumonia was not uncommon as a terminal event. If one regarded the other side of the question, and considered diseases which had been liberally treated with arsenic, one would be struck by the absence of pneumonia in many of them. Chorea, for instance, which was quoted, had been very liberally treated with arsenic, yet he supposed most people would say that the number of cases that had been seen in which pneumonia supervened in the course of chorea was very small. He could not recall a single case of the kind, though he was not asserting that they did not occur.

Dr. PARKES WEBER, in reply, said that though arsenic was frequently used, it was not usually given in big doses, but in lymphadenoma big doses were sometimes tried, and arsenical symptoms not unnaturally were then occasionally met with. Although the connexion between arsenical therapy and herpes zoster was now generally acknowledged, there were still medical men of considerable experience who had never met with a case of herpes zoster in a person undergoing treatment by arsenic. That fact showed that certain results of arsenical therapy might remain outside the personal experience of many medical men. He thought that it was conceivable that a drug might predispose to a disease of microbic origin, like pneumonia, and yet cause the disease in question to take a mild course. Perhaps arsenic not only predisposed to herpes zoster (which was possibly a disease of infectious origin), but likewise caused the herpes zoster to be of a milder type than non-arsenical herpes zoster often was.

Medical Section.

February 25, 1913.

Dr. Frederick Taylor, President of the Section, in the Chair.

Some Cases of Polycythæmia.

By Gordon R. Ward, M.B.

It is more or less customary to divide cases of polycythæmia into (*a*) relative and (*b*) absolute. Relative polycythæmia includes those cases in which there is a concentration of the blood due to excessive loss of fluid from the body, as in cholera, the rapid formation of pleural or other effusions, excessive perspiration, &c. Absolute polycythæmia, on the contrary, is distinguished by the presence of an actual increase of red cells above the normal amount for the whole body. This class includes erythræmia, the polycythæmia so frequently associated with congenital heart disease, and that of acquired lung and heart disease, together with a few other forms.

It is obvious that the second class, absolutely polycythæmias, will show at autopsy or before, according to what methods of investigation are available, signs of increased formation of red cells. These will include increase of the red marrow in area, dilatation of vessels due to a compensatory hydræmia following increased viscosity of the blood, the presence in the circulation of immature or of obviously new formed red cells or of nucleated red cells, and perhaps secondary and less definite signs, such as otherwise inexplicable hypertrophy of the left ventricle. In the first class there should be no signs of such increased formation of red cells. Thus the two classes would at first sight appear to be fairly easy of differentiation both clinically and pathologically. In the cases I shall presently describe I hope to show that it is not at all easy, and may be quite impossible, so to separate different cases of polycythæmia. This is made plainer by an example. Case XXI is that of a man with acute heart failure; his red cells were 7 million when he was first seen and fell in four days to 3½ million as the cardiac condition improved. This would appear to be a simple example of concentration. Yet there was here irrefutable evidence of rapid new red cell formation in the shape of a blood crisis. Case XII also shows a blood crisis due to heart failure, but this was further complicated by other factors. Suppose that either of these cases had not recovered entirely from the heart failure—i.e., that compensation had been inadequate as far as the ability of the heart was concerned. Then there would have arisen a compensatory polycythæmia in addition, and this would have been permanent, in fact, an absolute polycythæmia. Case XIII is also an interesting one, since there was here a compensatory polycythæmia called into being by inability of the heart to deal with the altered circulatory conditions induced by disease of the suprarenals. The whole course of the disease did not exceed three weeks, and yet there was an absolute polycythæmia present at the time of death. In this case it was shown chiefly by the increase of bone-marrow noted at autopsy. Here, then, was an absolute polycythæmia due to circulatory failure induced within the space of three weeks. If this can occur why should it not be possible also in septic conditions in which, as a matter of fact, one usually explains the concentration of the blood as due to excessive sweating following pyrexia, or to some similar cause which is clinically apparent?

In endeavouring to group the twenty-four cases which I here put forward, it has been quite impossible to class them into absolute and relative. It has therefore been necessary to fall back upon a theoretically less satisfactory classification. This is largely ætiological, but in part purely clinical. There are thus six "idiopathic" cases, of which one is possibly an example of hereditary erythræmia while the other five fall into two groups. There are five cases of polycythæmia associated with congenital heart disease, of which two are further noteworthy for the persistence of a blood-picture which is distinctly embryonic. Both of these were probably prematurely born children. One similar case has been recorded in America, but not very fully. Otherwise, I have not been able to find any mention of the condition in the literature. There are also compensatory, reactive, therapeutic, mixed or infective, and doubtful groups of cases.

Group I.—Congenital Polycythæmia.

In this group there are five cases, and in all the polycythæmia was associated with cyanosis; in all the cyanosis was persistent, and in two certainly, probably in all, there was clubbing of the fingers. Case V is noteworthy inasmuch as there was no murmur appreciable clinically. This anomaly was also present in Case II and is usually regarded as being associated with an extensive lesion. This was so in the cases of Audry [1], and of Wright and Drake [5], both of which came to autopsy and in both of which there was polycythæmia and cyanosis. In the first instance there were *Rechtslage*, marked pulmonary stenosis, defective interventricular septum, and patent ductus arteriosus; in the second there was no interventricular septum, very little of the interauricular and apparently no pulmonary artery at all. The latter fact is in part explained by the circumstance that it was only possible to examine the heart, and although one of the arteries present probably went to the lungs, it was not placed in the usual position, and it was not possible to trace its course.

Cases I and II are both examples of persistence of the embryonic blood-picture. This is to some small extent a matter of inference, since the blood of a living embryo has very seldom been examined. This was, however, done by Engel [2], who studied the blood of an embryo 23 cm. long—i.e., presumably in the fifth month. The heart was still beating. He found a higher colour index, the hæmoglobin being 80 per cent. and the red cells 3,300,000 per cubic millimetre, while there were 12,500 white cells per cubic millimetre. The interesting part of his report is, however, that which deals with the nature of the red cells. There were 27,500 nucleated red cells per cubic millimetre, and most of these were normoblasts with polychromatophile protoplasm. There were great differences also in the size and staining reaction of the red cells. In Case I here reported there were 2,900 nucleated red cells per cubic millimetre, in Case II they varied from 224 to 69,080 per cubic millimetre. I am indebted to Dr. Braxton Hicks, of the Westminster Hospital, for the figures of the first and the fourth examination in this case. That there were great differences in size and shape the photograph shown sufficiently attests. There were also myelocytes present in each case, as was noted by Engel in his case. It is well known that the blood in leukæmia, and to a less extent in many of the anæmias of children, tends to assume the embryonic picture, and an excellent example of this has recently been reported by Treadgold. In such cases the blood comes to resemble, as far as the red cells are concerned, the blood of the two cases recorded here. It may, then, be granted that we are dealing with an embryonic blood-picture which has persisted after birth. It is very rare to find any nucleated red cells after the first three days of extra-uterine life, and even before that they are not as a rule at all numerous. In these two cases the children may have been premature. In the first case this is to be inferred from the small size of the child, as there is no definite note to that effect. In the second case the child was expected at the end of September, whereas it was born on the 3rd of that month. This will, in part, explain the blood-picture at birth, but does not explain why it continued to be present in the second case on the forty-sixth day, by which time, had the child been born at full term, there should have been no nucleated red cells present. Moreover, in the case of Wright and Drake above mentioned there were normoblasts present at the age of 8 months, although the child was apparently born at term.

We are, then, dealing with a congenital abnormality which is presumably in the nature of a deficient development, and is to be classed with hare-lip, hypospadias, &c. In both of these cases it was associated with congenital heart disease. It is true that this was not verified post mortem, but if we suppose that it was not present we disregard the analogy with Wright and Drake's case, which is otherwise complete, and must invent some new disease to account for the cyanosis and polycythæmia. How far the congenital blood condition was dependent on the congenital heart condition one cannot say. The two co-existed, and the second probably necessitated at least some degree of the first—viz., the actual increase in red cells. It is not clear that it must also have necessitated or called into being the embryonic blood-picture. Many cases of polycythæmia and congenital heart disease have been recorded as co-existing at as early an age as 2 weeks, but in only one, so far as I have been able to discover, is this peculiar blood-picture mentioned.

Case I.—The case of a child, aged 2 weeks, suffering from congenital heart disease with cyanosis. The child was very ill developed and probably immature, was too feeble to cry, and very difficult to feed. The duration of life is not known, as the child was removed from hospital, since no hope could be entertained of giving her any relief. It is possible that this child was in age a fœtus; she had been born two weeks, but was of an appearance that would have accorded with premature birth.

The case should be considered together with Case II, which presents many points of similarity. In both there was a persistence of the fœtal type of blood formation, and about 7 million red cells per cubic millimetre, with a very large number of nucleated red cells.

Case II.—The case of A. E. D., aged 2 weeks. The child was born in a lying-in hospital on September 23, 1912, and died on December 19 of the same year. She was cyanosed at birth, and the cyanosis persisted as long as she was under observation. It varied from hour to hour, and at times was relatively slight. The fingers and toes showed well-marked clubbing. There were present many of the features of Mongolian idiocy, and the child as a rule took no notice of such procedures as puncturing the ear to obtain blood. The child, however, took the breast well. With the exception of an attack of green diarrhœa there were no illnesses during life. The condition at death is in doubt, as the child was then at the parents' home, and no reply has been received from the doctor who was in charge of the case.

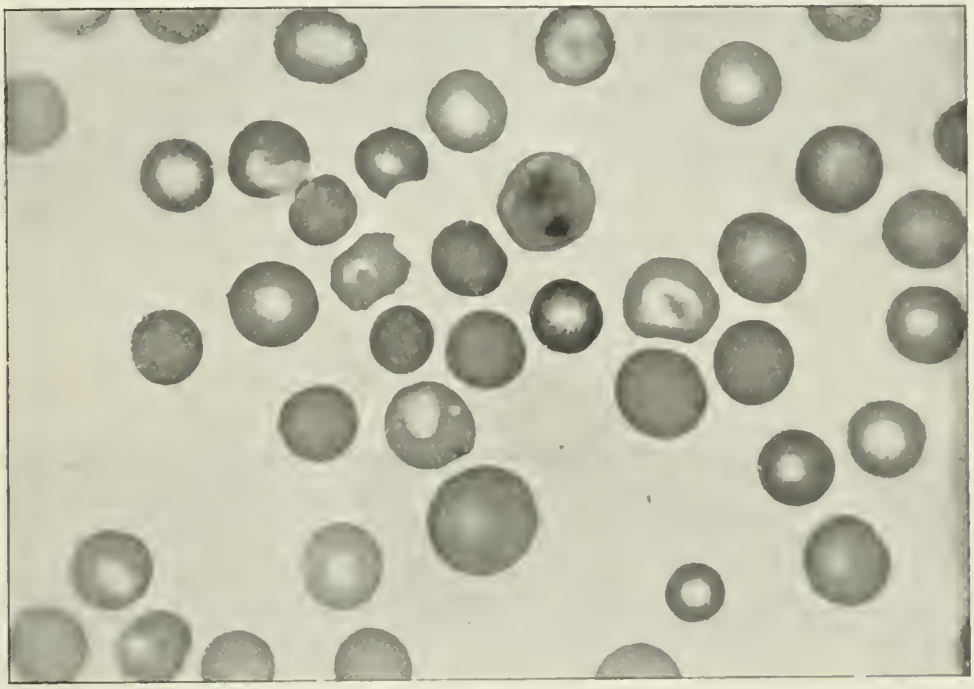


Fig. 1.

Photomicrograph of the blood in Case II, showing variations in size, shape, and staining affinities of the red cells.

It was noted that the blood was very much darker than is usually the case with a corresponding degree of polycythæmia. The amount of reduced hæmoglobin in the blood was, therefore, considerably more than normal; yet the child was not breathless on any of the occasions on which this observation was made. The cyanosis depended, of course, on this increased CO_2 content of the blood. We are faced, then, with the fact that there was a polycythæmia apparently caused by the heart lesion, and yet so much in excess of what was required that respiration was carried on comfortably while the blood was far from the normal saturation of oxygen. This is such an anomalous position that it would seem that there must have been some factor for which allowance was not made. It is not proposed to elaborate the point here, but merely to point out that the polycythæmia may possibly have been congenital and independent of the cardiac lesion. This would account for the lack of oxygen saturation co-existing with normal respiration. It, however, requires further cases and more exact investigation to decide such points. It may be remarked that the possibility of the cyanosis in congenital heart disease being dependent on something other than the heart lesion has often been mooted. This case may provide a possible explanation if it be considered that here the cyanosis was due to the fact that there was no need for full oxygen saturation of a polycythæmia which was merely congenital, as, for example, hare-lip is congenital. There was no splenomegaly, nor was any murmur heard over the cardiac area, although frequently sought for. The conjunctival vessels were very distinctly dilated, so that the presence of increased blood volume is very probable. I am indebted to Dr. Purves Stewart for calling my attention to this case and allowing me every facility for studying it.

Case III.—The case of A. Q., aged 5. This is a case of congenital heart disease probably of pulmonary stenosis, with patent foramen ovale. The degree of polycythæmia has not varied during the last two or three years, and the condition of the patient is very fairly satisfactory. He is occasionally admitted to hospital for a rest and usually recovers himself very soon. On the occasion of this count it was noted that the fingers were markedly clubbed and very cyanosed. There was dyspnœa on exertion.

Case IV.—The case of a girl, aged about 20. There are, unfortunately, no notes available of this case, as the name has been lost. The writer, however, remembers her as a girl who used to come into hospital from time to time for exacerbations of her heart condition. She was not very markedly cyanosed, and the dyspnœa present on admission usually vanished after rest in bed. She had congenital heart disease, but of what nature is not remembered.

Apparently the increase of the red cells to 9 million was sufficient to compensate the heart lesion, which we must therefore presume not to have been very severe. In other adult cases the compensation seems to have been adequate only with a larger number—viz., about 12 million. Probably variation in the number of red cells is one of the most readily available and least easily exhausted of all methods of compensating a heart lesion.

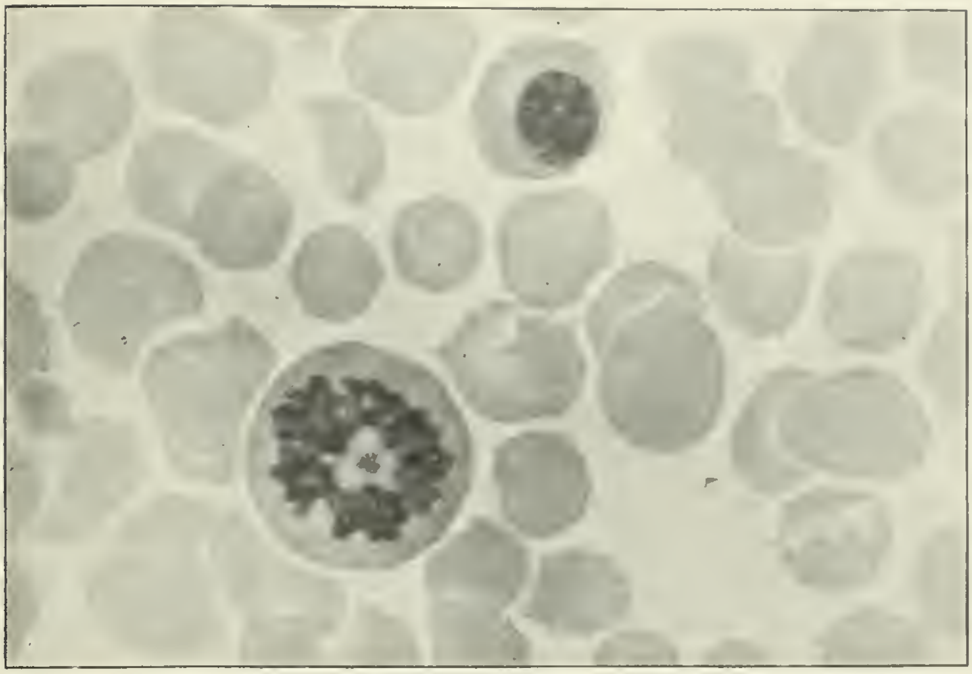


FIG. 2.

Photomicrograph of blood in Case II, showing two nucleated red cells—one a megaloblast in mitosis.

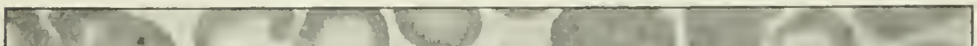


FIG. 3.

Blood from a boy, aged 12, suffering from congenital heart disease with polycythæmia. Note anisocytosis and other changes somewhat similar to those in fig. 1, but much less in extent.

Class V.—The case of A. E. N., aged 8. I am indebted to Dr. Kelly, of the Western Fever Hospital, who called my attention to this case. She was admitted with a severe attack of measles, and was then very cyanosed, and was said to have been so since her third year. The history was, however, rendered somewhat unreliable owing to the mental calibre of the available parent. She is said to have had "heart trouble and paralysis" at the age of 3. One month before this examination was made she had epistaxis and melæna. At the date of this count she had quite recovered from the measles and appeared to be in good health, being cheerful, and only dyspnœic on exertion—her normal condition. It is noteworthy that she passed without mishap through a severe attack of measles. Notes made on December 2, 1912: There is considerable clubbing of the fingers and of the toes. The cyanosis is not extreme and at times is really very little apparent. There is a small accessory auricle on the left side. There is a tendency to sweating about the head, but no other signs suggestive of rickets. She has had a rather severe stomatitis, but this is now gone; there remains one septic stump. The heart is very decidedly enlarged to the left, being nearly an inch outside the nipple line. It is not otherwise increased in size to percussion nor displaced. The apex beat is forcible and reduplication is well felt. On auscultation there is well-marked reduplication of the sounds, but there is no bruit or thrill. I understand that there has been no bruit since she has been under observation. The heart sounds are heard all over the chest, but in less intensity than at the apex. There is marked puerile breathing all over the chest. There is no enlargement of liver or spleen. There is considerable wasting and deformity of the left leg—apparently the result of acute anterior poliomyelitis. Diagnosis is presumably deficient interventricular septum, possibly with some degree of pulmonary stenosis.

The chief point of interest about this case is the fact that the cyanosis is said to have come on about the age of 3, and in connexion with an attack of infantile paralysis: traces of the latter remain. If the history is reliable the fact is not, of course, without precedent, and the cyanosis, &c., would be presumed to have followed opening of the foramen ovale under some sudden stress. Probably the history is not reliable. It may be noted that the resistance of the red cells to the hæmolysis by salt solution was markedly increased. There was only a slight trace of hæmolysis in 0·35 per cent. saline, and it was not complete until 0·2 per cent. was reached. The solution made to test the hæmolysis was used also in Case II. The solution when made was sealed up in half centimetres in vaccine tubes and then sterilized. This enables it to be kept indefinitely without evaporation and without growth of bacteria. It is therefore quite certain that this increased resistance to hæmolysis was no experimental error. It lacks any obvious explanation so far as the writer is aware.

GROUP II.—FIRST IDIOPATHIC GROUP.

Case VI.—The case of T. G., aged 21. The chief interest attaching to this case is derived from the fact that he was the son of a man undoubtedly suffering from erythræmia or splenomegalic polycythæmia.

The father's case has been recorded in the *Westminster Hospital Reports*, and he was several times shown at meetings of medical societies. His symptoms came on so gradually that he is unable to say when the disease first showed itself. He wrote to me as follows: "From a child I remember suffering from cold feet and hands, with aching of the legs and partial deafness." About the age of 21 he visited a doctor for treatment of "bad throat and terrible congested cough on rising in the morning, which has stuck to me ever since." Later he was treated at King's College Hospital for "inflammation and pain in the bones." Tha father's symptoms, therefore, date for at least thirty years from the time that he first saw a doctor, and were at first very indefinite in nature.

The son is the only one of the family who resembles his father physically or temperamentally, and came under observation solely because his father thought he was developing the disease from which he himself suffered. He was a well-developed individual with a reddish complexion, but with no signs of dilated venules on the face or conjunctivæ. He was suffering from fairly well marked acne vulgaris, but there were also several reddish raised papules rather resembling telangiectases on the face. These were not very definite. His hands and elbows were red, but the rest of the body was of a normal colour. He worked all day at a lathe in a workshop and not exposed to the weather; this may have had something to do with the colour of his hands, but that it really had is very doubtful. There was no enlargement of the spleen or liver nor any abnormality of heart or lungs. The hands became red and mottled when allowed to hang by his side—more so than is the case in normal individuals. He said that he had always enjoyed fair health, but was liable to sore throats. It may be noted that throat trouble was one of the early complaints of the father. As regards his circulation, he noted that his hands and elbows occasionally became very red without any cause that he was aware of; that he suffered from "pins and needles" in the feet and hands after a warm bath, but not always, and that he had cold feet and chilblains in the winter. He also mentioned that his hands "looked like boiled lobsters" when put into hot water, and that he bled rather readily, and that the bleeding was on occasion difficult to stop. He instanced that a small pimple on his face once bled all the time that he was travelling from Shepherd's Bush to Marylebone and back again. Especially in cold weather he had a tendency to vomiting, or, at least, nausea after breakfast, and tea at any time disagreed with him. He said that he would feel dizzy if he were told to hold his head between his knees. He had been taking citrate of iron for two weeks prior to the day on which he was first seen. It had apparently been prescribed by his father on the general principle that iron is good for disorders of the blood. He did not continue to take it. It will thus be seen that the son presented only the vaguest symptoms of a kind which would probably have passed unnoticed if it had not been that the condition of his father called attention to them. He did, however, have some degree of polycythæmia. The blood was examined on two occasions with an interval of three months. There was practically no difference between the two counts of red cells; in the first instance 6,570,000, and the second 6,490,000. The hæmoglobin was 103 per cent. and 101 per cent. on the same days. The white cells were just above normal, being 10,200 and 11,100 per cubic millimetre. The size and shape of the cells appeared normal and the spectrum was normal.

This, then, is a possible case of erythræmia, although the evidence is by no means all that could be desired. If it is really erythræmia the case is unique in being hereditary. The writer's opinion is that although there is not sufficient evidence for a positive diagnosis of erythræmia there is yet no other obvious explanation of the polycythæmia and the other facts noted.

GROUP III.—SECOND IDIOPATHIC GROUP.

In this class are placed two cases which had in common a sparseness of subcutaneous fat, a polycythæmia reaching 7 million, and a peculiar brick-red complexion. The skin was also very dry in each case. These may seem poor grounds for suggesting a subdivision of polycythæmia, but the fact that the blood of the second case was only examined because her appearance suggested that of the first one is evidence that there may be some grounds for classing them together. There was in neither case any evidence of a dilatation of the blood-vessels, and in Case VII it was even noted that they seemed unduly empty, since there was practically no bleeding during a prolonged operation. In this case the blood-pressure was noted to be 140 on one occasion, and this, although not greatly above the normal, might lead to a comparison with the "polycythæmia hypertonica" of German authors. However, there are in the series of cases here presented others in whom the blood-pressure was higher, and yet which in no way resembled this case. The writer does not suppose that many people in this country would demur to the statement that the association of high blood-pressure and polycythæmia is insufficient evidence of a new clinical entity.

Case VII.—The case of M. H., female, aged 47, suffering from lateral sclerosis. The history in this case was in no way noteworthy. The onset of the nervous disorder had been gradual, as is usually the case, and it did not present any novel features. There was, however, a complication of uncommon nature. The patient vomited after every attempt to take food. She had a history of gastric ulcer many years before. Exploratory laparotomy was performed and she was found to have an hour-glass stomach. The contraction was so extreme that it was obvious that no solid food could have passed the obstruction for a long time. A plastic operation was performed by Mr. Ballance and there was thereafter no return of unpleasant symptoms. The polycythæmia when first noted reached 7,365,000 red cells per cubic millimetre, but her peculiar red colour suggested that this was not due to concentration following starvation. The fact that the operation did nothing to relieve the polycythæmia confirmed this view. It is possible that this type of cyanosis represents a definite class, although there are not at present sufficient grounds for labelling it as a new syndrome. The signs of the blood condition were very few. The only one of note was a peculiar dry and red complexion. The redness was best seen in the lips and mucous membranes, but there were no dilated vessels or any suggestion clinically of increased blood volume. Cyanosis was never noted, except on one occasion. This occasion was of some interest. The patient both before and after operation had great difficulty with the bowels, which were seldom open without an enema. Aperients were usually of no avail. It was one day noted by the writer that her colour seemed more nearly normal, and on inquiry it appeared that her bowels had been opened naturally twice the day before. They were opened twice on the day that this observation was made and twice on each of the two following days. The colour was noted as being less normal than previously, but still not as red as was her wont. On the fifth day the bowels were again confined and the colour was noted as "almost bluish." This is the sole reference to anything approaching cyanosis which was made during the time she was under observation—with intervals, more than six months. A blood examination made on the "almost bluish" day showed red cells 6,460,000 per cubic millimetre, and hæmoglobin 104 per cent. It may be noted, in view of the fact that sulphæmoglobinæmia is associated with cyanosis and constipation, that the spectrum was normal on this occasion—i.e., that of oxyhæmoglobin. Sulphæmoglobin was looked for, and as the writer is familiar with the appearance of its characteristic spectrum in the blood it may be taken that it was not present. The association of the more normal colour and subsequent cyanosis with differing conditions of the bowels is nevertheless interesting. The fact of an operation being performed enabled one to state with certainty that there was no enlargement of the spleen or liver. It was also noted that almost no blood oozed from the incisions and that the subcutaneous fat was very deficient. The colour of the face was normal for less than twenty-four hours after operation, and then returned to the somewhat vermilion redness already noted. The blood-pressure was estimated on one or two occasions and was found to vary between 116 and 140 mm. of mercury with the Riva-Rocci instrument.

Case VIII.—The case of E. B., aged 59, suffering from a small patch of some scaly eruption situated over the sternum. According to the patient's story this had neither been definitely diagnosed nor successfully treated in spite of application to the skin departments of several London hospitals.

It should be mentioned for what it is worth that at the time of this count she had had fifteen ten-minute applications of radium. A small (1 c.c.) square of varnish was used with a millimetre nickel shield covered with thin rubber. The dose was therefore very small, but since it was applied over the sternum, which is very active in blood formation, there is just a possibility that the marrow was to some extent stimulated thereby. In large doses, radium, like the X-rays, probably causes atrophy of the marrow, but in small doses there may be an opposite effect, as is sometimes seen in the case of other poisons.

This patient had a dry red skin and little subcutaneous fat, as in the last case.

GROUP IV.—THIRD IDIOPATHIC GROUP.

This group contains three cases, and in all there was polycythæmia, with excess of subcutaneous tissue and a generally fat and unhealthy appearance. In two cases there was noted dilatation of the conjunctival vessels and in two there were small telangiectases about the body. In none of the cases was there any apparent cause for the polycythæmia unless a slight amount of emphysema be regarded as sufficient. That it should not be so regarded is evidenced by the absence of polycythæmia in many much more severe cases of emphysema. In only one case were repeated blood examinations made. All disclosed polycythæmia. The type of individual included in this group is well known, but in all the instances here advanced there was some definite disease present—not, however, of a nature to produce polycythæmia. Before giving an opinion as to the validity of grouping these together as a subdivision of polycythæmia, it would be necessary to collect the blood of persons otherwise normal but "plethoric." Until this is done it may be noted that there is an obvious defect of metabolism—probably in the nature of deficient provision of oxygen, since there is considerable adiposity. A natural reaction to insufficient oxygenation would be an increase in oxygen carriers—i.e., the red corpuscles of the blood. It may be that some such explanation of these cases will eventually be found to hold good. The writer is forced to place them in a separate group because they do not seem to admit of other classification and yet present analogies with each other.

Case IX.—The case of J. B., aged 71, suffering from facial paralysis following removal of cervical glands secondary to a malignant growth of the tongue. This had occurred four years before the patient was seen, and there was no recurrence. He enjoyed good health and was of a plethoric and obese type. There was slight but obvious dilatation of the conjunctival vessels and some spider nævi on various parts of the body. There was a little emphysema and a few moist sounds at the base of the right lung. Except for the cancer of the tongue, there was nothing of note in the past history. He had some symptoms of enlarged prostate and weighed 14 st. In this case the red cells were 6,260,000—i.e., not a very excessive number, but the hæmoglobin was 118 per cent., so that the colour index was near unity. This was so in spite of the fact that there were some qualitative changes in the blood, a few megalocytes, some polychromasia, &c.

In polycythæmia due to concentration it is very rare to meet with a normal colour index, and this is equally true of other varieties of polycythæmia. It may be the case, although there is no factor in operation which is of a nature recognized as tending to produce anæmia of the individual corpuscles. This patient was a typical example of the plethoric type and it is possible that the polycythæmia was merely another expression of that fact.

Case X.—The case of R. G., aged 54, suffering from arterial and other changes consequent on exposure to lead dust. Patient had worked for forty years as a compositor, but had had no illness that he knew of until about a year before he was seen. Then after a period of extra work he suffered from indigestion. Later he had an attack of colic and next day developed wrist-drop. Since then he had been recovering. He had very rigid arteries and albuminuria. The heart was hypertrophied. The conjunctival vessels were injected, and this had been noted by the patient himself. He was a plethoric-looking individual and clinically resembled Case IX. The red cells were 6,440,000 per c.mm., and as in that case the hæmoglobin also was well above normal, being 116 per cent.

If high blood-pressure can of itself cause polycythæmia this might be said to be an example of that association. It is difficult, however, to see how it can do so in the absence of stasis in some part of the circulation, and even then the polycythæmia would probably be local and relative for a considerable time. There was no sign of stasis in this case; the high blood-pressure was apparently quite adequate compensation for whatever condition called it into being. The blood did not show the qualitative changes of lead poisoning, so that the case was probably not one of excessive blood regeneration: indeed, the high colour index almost excludes this. In the light of the knowledge available the polycythæmia remains unexplained, unless the plethora is sufficient explanation.

Case XI.—The case of W. H., aged about 40. This patient presented a rather unusual syndrome. He was of the plethoric type of Cases IX and X, but had in addition other ills. He was slightly jaundiced and slightly pigmented, and had also glycosuria. The jaundice was apparent in his conjunctivæ and to a less extent over the whole body. The blood serum was unduly yellow and when diluted about twenty times gave a distinct play of colours with nitric acid. The urine was frequently examined for bile pigments, but the results were unsatisfactory since there was considerable intestinal absorption. This was sometimes shown by considerable excess of indican, sometimes by excess of indigo red. At other times neither of these bodies was present in great amount, urobilin was excessive or there were some other less readily identified bodies present which gave Gmelin's reaction but failed to give other tests for bile pigments, or gave only some of the other tests. The jaundice became less after a month's treatment, and when the patient was no longer glycosuric. The pigmentation was in two forms. The first was a diffuse golden pigmentation distinct from the jaundice, and especially apparent on the hands and face, and the second was in the form of "freckles" on the face and hands, and similar but larger spots on the abdomen and elsewhere. There was no pigmentation of the external genitals. It was noted that some of these "freckles" were situate about the hair-follicles, but that others were not so placed. The pigmentation was apparently not nearly so great in degree as that of most cases of hæmochromatosis, but the possibility of that syndrome was present to the author's mind when noting the position of the pigmentation. The glycosuria was variable in amount, but 3 per cent. was the highest out of some twenty examinations. The sugar present did not give any reactions for lævulose. While the patient was still passing sugar the daily amount of urine was about 1 to 1,300 c.c., but when he was sugar-free the amount rose and remained at from 1,300 to 1,900 c.c. *per diem*. These variations do not seem to have been in any way reflected in the blood. The blood-pressure was at first as high as 180 mm. Hg., but as he improved fell to 100 to 110. (All observations with a Riva-Rocci instrument on the brachial artery.) The only other matter of interest about the patient was his mental condition, which was one of morbid obsession and morbid fears. He was also very intolerant of opium in any form and became non-glycosuric as soon as he was put on a sugar-free diet.

It may be noted that the glycosuria, the mental state, and the pigmentation are all said to have been present and first noted five years before his present course of treatment. Polycythæmia has been noted in diabetes on more than one occasion. In this case, however, it was present when there was no sugar in the urine.

GROUP V.—COMPENSATORY.

Case XII.—The case of P. S., aged 42, suffering from bronchitis, emphysema and heart failure. The history was that he had an attack of cough and dyspnœa in Christmas, 1910. Before then he had been in good health except for attacks of "asthma." This was probably the true asthma, as his mother also suffered from it, and his description agreed with the usual type of nocturnal attacks, &c. He was in bed nine weeks, but was then able to return to work. In the winter of 1911 he had another attack and was in the Middlesex Hospital for three weeks. The diagnosis then was bronchitis and asthma. No blood examination was made. He had psoriasis of legs, arms and face. After this attack he was often in bed and was never able to return to work. In August, 1912, he was admitted to the Westminster Hospital under the care of Dr. Purves Stewart. He was then suffering from emphysema, heart failure, and œdema of the legs and back. During his stay in hospital he slowly recovered, but on discharge was still cyanosed and was sent to the Infirmary. His condition varied somewhat from day to day, and all the signs of heart failure were present at one time or another. Thus there was œdema of the lungs, legs, and loins, ascites, venous pulsation in the neck, enlargement of the right and left sides of the heart and liver, and considerable drowsiness. The spleen was not felt. The thorax was very rigid and moved very little on respiration. His blood was examined three times. On the first occasion, which was on the day after admission, there were 11,720,000 red cells per cubic millimetre. There were no nucleated red cells. The writer examined the blood on the thirteenth and fourteenth days after admission. He was then slightly improved, but not very much. On the thirteenth day he appeared to be very ill, was sitting up in bed gasping for breath and hardly able to speak for the dyspnœa. The red cells were 10,000,000 per cubic millimetre, and there were 731 nucleated red cells per cubic millimetre. There was thus a fall since admission and apparently a blood crisis in progress. He was cyanosed and drowsy, and passed only 20 oz. of urine that day. On the next day he expressed himself as feeling much better and was able to converse without difficulty, other than that due to the fact that he knew very little of three languages—viz., English, Yiddish, and German. Nevertheless he passed only 15 oz. of urine on this day. The blood showed a further reduction of red cells to 8,760,000 per cubic millimetre, while there were only 210 nucleated red cells per cubic millimetre.

The improvement in his condition and the state of the blood seemed to indicate that he was relieving the blood viscosity which embarrassed his heart by dilution. This dilution would ordinarily show itself by some increase in the amount of urine excreted, for Nature does not seem to perform just that dilution required to give the heart relief, but rather more; or it may be that, however beneficial the dilution, the kidneys are bound to do their best to remove it, even if for other reasons concentration (i.e., polycythæmia) is necessary. However this may be, he did not pass more urine but less. The explanation is probably to be found in the note of the fifteenth day, on which for the first time ascites was noted. The fluid which had diluted the blood and relieved the heart was lost in part in the peritoneal cavity.

The case is very similar in some respects to Case XXI, in which there was also heart failure but no œdema or ascites. Dilution of the blood as shown by the fall in red cells was accompanied by an increase in the amount of urine excreted and improvement in the patient's condition. It was also accompanied by a shower of nucleated red cells —i.e., a blood crisis. An examination of the blood in these cases seems to show that the blood is diluted by fluid on its way to excretion either externally or internally and that this is followed by an improvement in the condition of the patient. The polycythæmia in this case is, however, only in part due to the heart condition, since the condition of the lungs obviously demanded some compensation by increase of red cells. This was probably a relatively old standing condition of at least two years' duration.

Case XIII.—The case of F. N., aged 16, suffering from acute tuberculosis of the suprarenals. The patient was an ill-nourished and very neglected child looking about six years younger than was the case. On admission to hospital, there was only a fortnight's history of illness—before that time she would appear to have been in what was for her normal health. She had applied for admission a week before it was possible to take her in, and did not at that time appear to be an exceptionally urgent case. Yet she died five days after admission. She therefore represented the acutest type of Addison's disease. The clinical signs and symptoms were quite typical, with the single exception of vomiting, which was absent. The general condition was one of collapse; the temperature never rose above 98° F., and only once reached that figure. The pulse-rate varied from 100 to 116, the volume was small, and the tension as estimated by the finger was almost negligible. The respirations varied from 24 to 30 per minute. There was slight diarrhœa, the bowels being opened twice a day and three times on the last day of life. There was generalized pigmentation of the body, and this, although very marked, was not more obvious in the flexures, and did not affect the mucous membranes. The mental condition was confused, and the patient was only conscious at intervals. She groaned continually, and pressed her hands to her head. Almost the only words that she said referred to the pain in her head.

It is obvious that one had here to do with a case of acute disease running a rapid course, and the diagnosis of Addison's disease was fully confirmed post mortem. There was no other sign of tuberculosis in the body, but the head was not examined, as permission could not be obtained. There is no doubt that the condition of the blood was one of very marked stasis, and one accordingly was not surprised to find a very fair degree of polycythæmia—viz., 7,025,000 red cells per cubic millimetre, with hæmoglobin 98 per cent. The exact mechanism of blood concentration in conditions of stasis is perhaps not altogether plain, but there can be no doubt that it does occur. But a secondary effect of stasis must also be a true increase in the number of circulating red cells, since this is a well-known and, as far as we know, invariable method of compensation for the resulting deficiency of oxygen carrying between the lungs and the tissues. In this case we are probably entitled to suppose that this compensatory mechanism had actually come into being, for at the post-mortem examination the marrow was found to be of a dark red, almost purple, colour, and the whole of the shaft of the humerus was filled with this, as well as the ends of the bone in which it is normally present. There is unfortunately no record of the microscopical examination of the marrow, nor does the writer remember whether or no it showed increased erythroblastic activity. It is therefore arguable that the colour was due solely to congestion, whilst the increase as shown by the active marrow in the shaft of the humerus might possibly be explained by the age of the patient, and especially by the fact that her development had apparently been much retarded. The writer is, however, of the opinion that this was a case in which some concentration of the blood, due to stasis, was accompanied by actual increase of blood formation.

Polycythæmia in connexion with Addison's disease has been noted by other writers [4], and there has been a tendency to suppose that it must be due to some specific action of the tuberculous toxin, an argument that derives a certain amount of support from animal experiments with tuberculin. By means of small doses it has been possible to produce a considerable, and not altogether transitory, degree of polycythæmia. Nevertheless, there does not seem to be any need to invoke the aid of such explanations in this case, since the facts are explicable by reference to similar cases in which the action of a tuberculous toxin was not in question (*see* especially Case XIV, in which the adrenals were destroyed by hæmorrhage).

Case XIV.—The case of H. S., aged 19, suffering from confusional insanity and hæmorrhage into the adrenals. The clinical history of the case is not of any particular note. The hæmorrhages into the adrenals took place at different times, and usually produced pain referred to the right side, and to some extent suggestive of appendicitis. The source of this pain was not understood until after death, and the confusion was the more easily explained by the absence of any classical signs of Addison's disease. In particular, the tension of the pulse was fairly good, as estimated by the finger. Post-mortem examination showed that the right adrenal was almost entirely destroyed, but that the hæmorrhages had spared a considerable proportion of the left. The heart was distinctly hypertrophied, was, in fact, what is called a renal heart, but the kidneys were not markedly affected. They were larger than normal, but the cortex was relatively diminished. The capsule stripped with very little laceration of the kidney substance. The renal changes were dominated by the element of congestion, and the liver and abdominal viscera were also congested. The marrow of the ribs was dark red in colour, as was also that of the vertebræ, but on microscopical examination it did not show loss of fat nor increased erythroblastic activity. There was a distinct increase in giant cells of the smaller sort.

The cause of the polycythæmia in this case was probably complex. There had been some diarrhœa before the count was made, and there was no doubt some stasis due to adrenal insufficiency, although, as already stated, this was not extreme. There was also adhesion of both lungs between the visceral and parietal pleura, and this, although not very marked, may have had some influence in determining the presence of polycythæmia. We have thus more than enough causes for a rather small degree of polycythæmia, and it is probable that the disease of the adrenals should be mainly incriminated. It is interesting to note that, in spite of the hæmorrhage, there were no signs of blood regeneration as far as the red cells were concerned, although there was a typical post-hæmorrhagic leucocytosis.

GROUP VI.—REACTIVE POLYCYTHÆMIA.

The difference between compensatory and reactive polycythæmia, perhaps, needs a word of explanation. Compensatory polycythæmia follows a stimulus to which the only adequate reaction is true polycythæmia, but reactive polycythæmia is met with in cases in which there is no discoverable need for polycythæmia, although there is a need for repair of the previously impoverished blood. It is, as it were, an excess where only a return to the normal was demanded. Why this excess should take place is not easy to explain, but it does take place, and can be exemplified from almost every department of medicine.

Case XV.—The case of F. L., aged 48, suffering from menorrhagia and metrorrhagia, diarrhœa of eight days' duration, and a septic condition of the mouth. The clinical history is not of particular note; the patient had lost a good deal at and between her periods for more than a year, and had various subjective nervous symptoms apparently referable to the anæmia. The diarrhœa was of recent development. The red cells were 6,957,000 per cubic millimetre, and the hæmoglobin only 51 per cent., giving a colour index of 0·367. She was of a yellowish colour, and looked to have about as much blood as the hæmoglobin estimation would suggest, or even less. The clinical picture was in fact very much that of Addisonian anæmia. The blood, however, was that of a post-hæmorrhagic anæmia. The large number of red cells is no doubt to be explained, in part at least, as the result of diarrhœa, but one is inclined also to suppose that the red cell formation was at the time very brisk, although, as is usually the case, the hæmoglobin formation was very much behindhand. A second examination about six weeks later tended to confirm this view, for the hæmoglobin had then risen about 10 per cent., while the number of red cells, although above normal, had fallen more than a million. There was not then any diarrhœa, nor had there been further loss of blood. The blood still showed plentiful signs of new red cell formation.

The two blood examinations in this case, without the advantage of an acquaintance with the clinical history of the case, would appear so unusual as to suggest errors in technique; with the clinical history this explanation is no longer necessary. It may, however, perhaps, be noted that the writer takes all possible precautions to avoid the error introduced by the personal equation of the hæmatologist, and that the previous count on any given case is never referred to until the subsequent one is complete and in black and white. In his experience this is a very desirable precaution.

Case XVI.—The case of A. W., aged 16, suffering from tuberculosis. The patient had suspicious signs at the right apex and a chronic cough, but no tubercle bacilli were detected in the sputum. He was widely pigmented, but had been taking arsenic. The pigmentation progressed even after arsenic had been discontinued. He had a septic mouth and two enlarged glands, one in the neck and the other in the axilla of the same side. There had not recently been any detectable loss of fluid by sweating, diarrhœa, or otherwise. The spleen was not enlarged, and the pulse was good. The red cells were 6,120,000 per cubic millimetre, and the hæmoglobin 74 per cent. The average size of the red cells was not increased. There were no nucleated red cells, but otherwise there were all the qualitative signs associated with anæmia. It should also be mentioned that clinically he looked anæmic and yellowish.

This is an example, in all probability, of what is sometimes called "tuberculous chlorosis," in which the red cell formation has risen above normal in response to the stimulation of blood destruction. That the products of blood destruction were present in the body is sufficiently attested by the yellowish colour of the skin. That it depended on the baleful activities of the tubercle bacillus is only a matter of inference, but in the absence of any other cause must be accepted.

Case XVII.—The case of A. A., an adult man suffering from ankylostomiasis. The red cells were 6,520,000 per cubic millimetre. Apart from the ankylostoma lesions, the patient was in good health.

The polycythæmia is probably explicable in much the same way as was that of the two preceding cases.

GROUP VII.—THERAPEUTIC POLYCYTHÆMIA.

In this group we meet with cases similar to those in the last except that we have some reason for supposing that we know the nature of the exact stimulus which causes the polycythæmia—i.e., that it is a drug. In the last group the stimulus to increased blood formation is of a physiological nature and is beyond our accurate recognition, although we may say, for example, that in any given case it may have been increased blood destruction or blood loss. In this group we are dealing almost entirely with the results of the administration of one of a very small group of drugs. These are often called hæmatinics, but the more we look into the exact pharmacology of these drugs the less can we confidently assert as to the way in which they act. We are therefore compelled at present to base our observations on purely clinical data. The giving of iron is known to be followed by increase of red cells; red cells contain iron, therefore the increase is due to the administration of iron. No one would subscribe unreservedly to that doctrine, but it amounts to the best working hypothesis at the moment.

It would have been easy in this group to introduce several cases of chlorosis—used as the name of one specific disease and not with the loose meaning of any mild anæmia of young women or in the equally pernicious and confusing sense of any anæmia in which the hæmoglobin is more reduced than the corpuscles. The writer, however, believes that there are no grounds for supposing that there is actually increased formation of red cells during recovery from this disease. The post-mortem findings do not support the suggestion and the evidences for mere concentration of the blood are so strong that it does not seem justifiable to include recoveries from chlorosis in which the blood has appeared to go above the normal in this group of polycythæmia.

Case XVIII.—The case of F. L., suffering from enlargement of the thyroid of three years' duration. During the last two years the thyroid had been practically stationary. The patient presented very marked pallor, but there was no sign of a yellow tint. This pallor had not altered during the time that she had been under observation, but she had been taking iron for nine months on the supposition that she was anæmic. The exact prescription was 3 mm. of liquor arsenicalis and 1 dr. of syr. ferri iod. three times a day. The red cells were 6,525,000 per cubic millimetre and the hæmoglobin 104 per cent. There was no cause for this that could be ascertained except the prolonged administration of iron and arsenic. The thyroid did not obstruct breathing at any time—a possible cause of polycythæmia. The case is therefore reported as possibly due to long continued administration of "hæmatinics."

GROUP VIII.—MIXED POLYCYTHÆMIA.

This group contains cases in which it is easy to fix some of the factors which may have been responsible for the polycythæmia, but not at all easy to say which of these was most important. This group should probably contain the majority of cases of relative polycythæmia, but where it has been possible to say that one cause of polycythæmia was obviously more potent than another the case has been placed in the group which this fact suggests.

Case XIX.—The case of J. B., aged 4, suffering from old-standing traumatic brachial paralysis and urticaria with diarrhœa. The red cells in this case were 7,090,000 per cubic millimetre. At the time of the blood examination the temperature was 100·4° F., the pulse-rate 128, and the respirations 32 per minute. The patient had then had intense and widespread urticaria for three days. This was assumed to be due to some mistaken article of diet, but this was not proved. There was also diarrhœa in part due to the administration of an aperient.

The blood condition may be conjectured to be due to concentration from these two causes and perhaps in part from a slight degree of cardiac insufficiency. The pulse-rate suggests the latter.

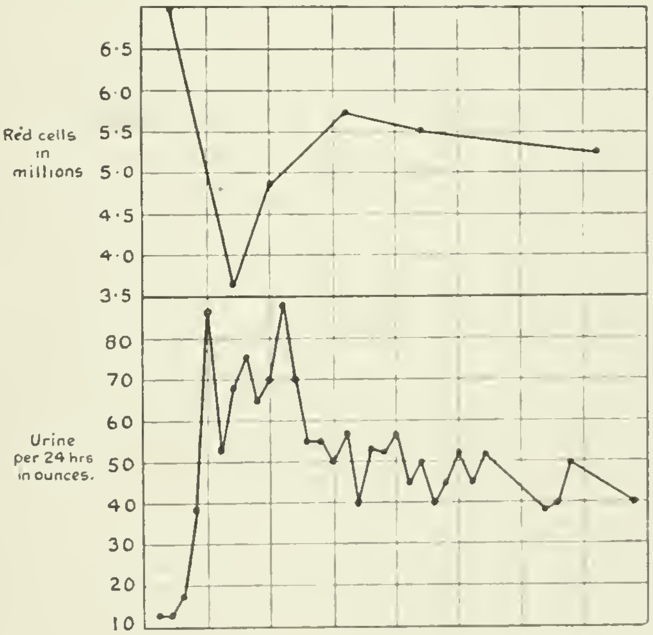
Case XX.—The case of H. S., aged 16, suffering from acute osteo-myelitis. The history of the case was in brief that, following an apparently trivial blow on the leg, he had swelling and redness. He was admitted to hospital and operated upon the following day. The tibia and fibula were found to be bare of periosteum throughout and surrounded by pus which contained the *Staphylococcus pyogenes aureus*. Three days after an abscess was opened on the clavicle and six days later he died with several other abscesses. The blood was twice examined, on the second and eighth days. On the first occasion there were 7,300,000 and on the second 6,925,000 red cells per cubic millimetre. The hæmoglobin was 100 per cent. and 65 per cent. on the same days. This very sharp fall in hæmoglobin was no doubt due to the intensity of the toxic process, and it is noteworthy that there were a large number of swollen red cells present which were poor in hæmoglobin. These were about 16 per cent. of the whole number of red cells and were doubtless responsible for the fact that the average size of the red cells was increased to 8 microns. The concentration of the blood was probably due to a variety of factors. He did not seem to lose much fluid by perspiration, the temperature was not high nor the skin moist. On the other hand, there was considerable diarrhœa, the bowels being opened six times a day for the last three days of life and less often on other days, but still abnormally often. A considerable amount of fluid was no doubt lost in this way. There was also undoubtedly a cardiac factor, the pulse-rate was as high as 160 on more than one occasion, and there can be little doubt that the heart muscle, like other parts of the body, was acutely poisoned and to that extent inefficient. Unfortunately there was no opportunity for a post-mortem examination of the marrow.

This case typifies very well the concentration of the blood seen in many acute septic processes, which has been mentioned as also occurring in Addison's disease, and which is sometimes assumed to be due to a specific action of the toxins on the bone-marrow. This case certainly requires no such explanation. It is true that there were some slight qualitative changes in the corpuscles suggesting new blood formation on the occasion of the second blood examination, but these are sufficiently explained as a response to the blood destruction already mentioned as taking place and neither invalidate the deduction that the polycythæmia was largely due to stasis (which was very apparent clinically) nor offer evidence that there was a specific toxin at work stimulating the bone-marrow to increased production of red cells.

GROUP IX.

This group contains only cases in which the precise cause of the polycythæmia is doubtful. Case XXIV is of some particular interest, but although cardiac failure was the prime etiological factor, it is difficult to say exactly how it brought about the result obtained. There was certainly concentration of the blood, but this was not due to any loss of fluid that could be detected; there was no ascites, no œdema, no sweating, diminution of the urine, &c. The fluid was lost from the blood to the tissues in some way, but not in any way that one can so definitely specify as to base a variety of polycythæmia thereon. It is true that this case showed a blood crisis—i.e., evidence of new blood formation, and to this extent falls into line with the absolute polycythæmias of chronic cardiac disease, but the major part of the polycythæmia seen in this case was quite independent of this particular factor.

Case XXI.—The case of W. C., aged 63, a cattle drover, suffering from acute pericarditis. The history of the case was as follows: One evening on returning from work the patient felt faint and vomited. He thought little of it, slept well and went to work as usual on the following day. He drove some cattle four miles to market, but on arrival felt very faint and vomited; coffee and brandy given as restoratives. He went home by train and on arrival felt very ill, complained of severe epigastric pain and sent for a doctor. The doctor was only able to make a provisional diagnosis of acute abdominal disorder and sent the patient into hospital. On admission he was seen to be in a state of collapse with a temperature of 96·2° F., a pulse-rate of only 56, and respirations 24 per minute. There were not sufficient signs of abdominal trouble to warrant operation, and the heart weakness seemed to be the most urgent trouble. He vomited several times, but except after he had taken anything to drink brought up little but mucus, occasionally stained with blood and presenting nothing unusual microscopically. On the following day the temperature rose to 100·2° F., the pulse to 80 per minute, and the respirations to 24. He continued to have considerable nausea and occasional vomiting. On the whole he was rather better, but came over faint and threatened to collapse on several occasions during the day. On the next day the condition was much the same,



Case XXI. Chart showing variations in red cells and amount of urine passed in the twenty-four hours.

but the pulse-rate rose to 100 per minute. The respirations were also increased to 44. The blood was examined for the first time on this day and was found to contain 7,062,000 red cells per cubic millimetre, hæmoglobin 114 per cent., and 26 nucleated red cells per cubic millimetre. There was no vomiting after midday. On this and the preceding day he passed only 14 oz. of urine; this was free from albumin. At no time during his illness was there any sign of œdema, ascites, or albuminuria. On the fourth day he was improved generally, but it was not until the fifth that the pulse fell again to 80 per minute. On this day he passed 86 oz. of urine. On the sixth day the blood was again examined and the dilution associated with the passage through the system of the large amount of fluid passed the day previous was very well shown. The red cells had fallen to almost half their original number and were now 3,750,000 per cubic millimetre. The hæmoglobin was 96 per cent., and on this and the next occasion the colour index was above unity. The relation of the output of urine to the concentration of the blood as shown by the number of corpuscles is shown graphically in the accompanying chart. This relationship is very striking, although it is rendered less obvious than should be the case by the complicating factor of new blood formation as shown by the presence of a blood crisis, immature red cells, &c. The blood examined on the ninth day, when the condition of the patient was obviously much improved, showed that the red cells were mounting up again, in other words, that the concentration of the blood was approaching normal once more after being acutely concentrated and as acutely diluted. As a matter of fact, this re-concentration was overdone, since on the fourteenth day the red cells were 5,810,000 per cubic millimetre, and thereafter fell to a normal figure. At the same time the excretion of urine reached an apparent normal for the individual of about 50 oz. *per diem*. The clinical course was one of steady improvement, marred only by a transient rise of temperature, when the patient was allowed to leave the hospital for a few hours for the purpose of recording his vote at the General Election then in progress. He had eventually another attack of heart failure, but whether he recovered again is not known.

This case shows the primary concentration of the blood following heart failure, the subsequent reaction of the marrow in producing new red cells, and the changes in the concentration of the peripheral blood produced by the passage through the circulation of large amounts of fluid previously held up in the tissues (?). Since there was never any œdema, ascites or loss of considerable fluid by vomiting this unstable state of the circulation was very well seen. The case is noteworthy as bearing on the question of the existence and continuance of a state of plethora, or, on the other hand, of a state of concentration of the blood.

Case XXII.—The case of H. K., a typical case of dementia præcox. Her age was 22, and her health, apart from the mental disturbance, seemed to be normal. As a result, however, of the dementia, she was from the circulatory point of view an example of severe and general stasis. She seldom moved of her own accord, and could with difficulty be persuaded to take a few steps in any direction. She had to be fed with a tube, and by this means received 3 pints of fluid daily. The tube feeding had been necessary for some weeks before the first blood examination was made. Her extremities and lips were almost invariably cyanosed, as is commonly the case in these patients. The first blood count showed 7,310,000 red cells per cubic millimetre, with 90 per cent. of hæmoglobin. The second examination was made about six weeks later, when the patient was again taking her food normally, and was for a while rather better in mental health. It showed just under 6 million red cells per cubic millimetre, and 86 per cent. of hæmoglobin. On neither occasion were there any definite signs of blood formation being hurried or excessive—i.e., there were no immature cells. Nevertheless, there were probably actually too many red cells in the body as compared with the normal, since the long-standing stasis must have produced some reaction of the marrow.

This case is a good example of the polycythæmia which may follow general stasis in the circulation. This does not, however, approach the degree met with in erythræmia, and one is very much inclined to doubt whether it could do so. Of a large number of melancholic patients examined, the majority had a larger number of red cells than 6 million per cubic millimetre, but only one or two reached 7 million, and in these that figure was not constant. In all such cases there is some degree of circulatory stasis, as is well known, but this is not so extreme as in well-marked cases of dementia præcox.

Case XXIII.—The case of E. J., aged 45, suffering from early tabes, and probably syphilitic meningitis. The red cells were 6,100,000, and there was no apparent reason for this increase. Unfortunately in this, as in other of the cases reported, only one blood examination was possible. This patient had a blood-pressure of 125, and the arteries were thickened—i.e., the temporals and radials.

Case XXIV.—The case of Mrs. H., aged 40, suffering from maniacal depressive insanity and hæmatoporphyrinuria. The latter was of sudden onset, but the patient was taking only veronal. It is not impossible that a dose of sulphonal was administered by accident, since other patients in the ward were taking the latter drug, but in any case only one dose can have been given. The presence of hæmatoporphyrinuria was fully proved by extraction of the pigment, spectroscopic and chemical examination.

The case is reported because Fells [3] has reported polycythæmia in a case of chronic sulphonal poisoning with hæmatoporphyrinuria. In his case there were 6,500,000 red cells per cubic millimetre, in this rather fewer—viz., 6,220,000.

CASES OF POLYCYTHÆMIA.

Case No.	Variety of polycythæmia	Known disease	Age	Day of observation	ERYTHROCYTES								ERYTHROBLASTS				HÆMOLYSIS TO SALINE SOLUTION		Hæmoglobin per cent.	White cells per cubic millimetre
					Per cubic millimetre	Maximum size	Average size	Minimum size	Poikilocytosis	Hæmoglobin value	Polychromasia	Stippling	Per cubic millimetre	Megaloblasts	Normoblasts	Division figures	Commencing in	Complete in		
						μ	μ	μ						Per cent.	Per cent.	Per cent.	Per cent.	Per cent.		
I	Congenital	Congenital cardiac	$\frac{3}{52}$	1	6,890,000	12	8·35	4	+	—	+++	+	2,900	1	94	7	—	—	—	4,000 to 5,000
II	Congenital	Congenital cardiac	$\frac{3}{51}$	1	7,200,000	—	—	—	—	—	—	—	224	—	—	—	—	—	110	11,200
				32	6,925,000	14	8·36	4	++	0·927	++	Few	48,571	13	81	23	—	—	128	17,000
				39	7,325,000	13	8·34	3	++	0·821	+++	O	34,000	2	94	20	0·4	0·3	120	12,000
				46	5,950,000	—	—	—	—	—	—	—	69,080	8	92	Many	—	—	120	31,400
III	Congenital	Congenital cardiac	5	1	11,060,000	9	7·31	6	O	0·75	O	O	O	—	—	—	0·4	0·3	160	8,100
IV	Congenital	Congenital cardiac	20	1	9,620,000	—	—	—	—	0·5	—	—	O	—	—	—	—	—	96	—
V	Congenital	Congenital cardiac	8	1	9,725,000	—	—	—	O	0·804	++	O	O	—	—	—	0·35	0·2	156	12,250
VI	? Erythræmia (Idiopathic I)	*Nil*	21	1	6,570,000	—	—	—	O	0·786	O	O	O	—	—	—	—	—	103	10,200
				97	6,490,000	—	—	—	O	0·776	O	O	O	—	—	—	—	—	101	11,100
VII	Idiopathic II	Lateral sclerosis	47	1	7,365,000	—	—	—	+	0·591	++	+++	O	—	—	—	—	—	87	9,900
				17	6,460,000	—	—	4	+	0·813	+	O	O	—	—	—	—	—	105	15,350
				49	—	—	—	—	O		+	O	O	—	—	—	—	—	98	9,950
				185	7,120,000	—	—	—	O	0·676	+	+	O	—	—	—	—	—	96	7,100
VIII	Idiopathic II	*Nil*	59	1	7,550,000	9	6·43	5	O	0·808	O	O	O	—	—	—	—	—	122	9,400
IX	Idiopathic III	Facial paralysis	74	1	6,260,000	9	7·34	6	+	0·944	+	+	O	—	—	—	—	—	118	5,750
X	Idiopathic III	Arterio-sclerosis	51	1	6,440,000	—	—	—	O	0·906	+	+	O	—	—	—	—	—	116	13,650

XI	Idiopathic III	Glycosuria	—	1	7,425,000	—	—	—	0	0·703	0	0	0	—	—	—	—	—	104	9,400
				12	6,333,000	—	—	—	+	0·833	0	0	0	—	—	—	0·4	0·3	105	6,466
				20	6,525,000	—	—	—	0	0·869	0	0	0	—	—	—	—	—	113	5,350
				29	6,625,000	—	—	—	0	0·818	0	0	0	—	—	—	—	—	108	5,533
XII	Compensatory	Emphysema	42	1	10,000,000	—	—	—	+	0·690	+++	+	731	0	100	24	—	—	138	8,450
				2	8,760,000	—	—	—	+	—	+++	0	210	0	100	20	—	—	—	7,000
XIII	Compensatory	Addison's disease	16	1	7,025,000	—	—	—	0	0·70	0	0	0	—	—	—	—	—	98	12,620
XIV	Compensatory	Addison's disease	49	1	6,525,000	—	—	—	0	0·676	0	0	0	—	—	—	—	—	88	15,700
XV	Reactive	Hæmorrhage	48	1	6,957,000	9	—	4	+	0·367	++	+++	10	0	100	—	—	—	51	10,400
				42	5,800,000	—	—	—	0	0·534	++	++	0	—	—	—	—	—	62	4,900
XVI	Reactive	Tuberculosis	16	1	6,120,000	10	7·44	5	+	0·606	+	+	0	—	—	—	—	—	74	5,150
XVII	Reactive	Ankylostomiasis	—	1	6,520,000	—	—	—	+	0·784	++	0	0	—	—	—	—	—	92	13,300
XVIII	Therapeutic	Goitre	14	1	6.525,000	—	—	—	0	0·80	0	0	0	—	—	—	—	—	104	6,800
XIX	Mixed	Urticaria	4	1	7,090,000	—	—	—	+	0·60	+	++	0	—	—	—	—	—	84	23,250
XX	Mixed	Osteomyelitis	16	1	7,300,000	10	7·99	6	+	0·641	0	0	0	—	—	—	—	—	100	32,800
				7	6,925,000	—	—	—	+	0·471	+	0	0	—	—	—	—	—	65	30,130
XXI	Doubtful	Pericarditis	63	2	7,062,000	9	7·31	6	0	0·814	+	+	26	0	98	24	—	—	114	26,500
				6	3,750,000	10	—	—	0	1·280	++	+	680	—	—	—	—	—	96	17,900
				9	4,981,000	—	—	—	0	1·091	+	0	0	—	—	—	—	—	108	13,200
				14	5,810,000	—	—	—	0	0·922	0	0	0	—	—	—	—	—	107	17,300
				20	5,550,000	—	—	—	0	0.973	0	0	0	—	—	—	—	—	108	17,100
				29	5,130,000	—	—	—	0	0·823	0	0	0	—	—	—	—	—	84	16,950
XXII	Doubtful	Dementia præcox	22	1	7,310,000	—	—	—	+	0·616	—	—	—	—	—	—	—	—	—	—
				41	5,920,000	—	—	—	0	0·728	0	0	0	—	—	—	—	—	86	6,550
XXIII	Doubtful	—	45	1	6,100,000	—	—	—	0	0·754	+	+	0	—	—	—	—	—	92	10,950
XXIV	Doubtful	Sulphonal poisoning	40	1	6,220,000	—	—	—	0	0·725	0	0	0	—	—	—	—	—	90	7,800

In the case under consideration there seems to be no reason to connect the polycythæmia with the presence of hæmatoporphyrin in the urine. So far as the writer is aware there is no evidence that the presence of this pigment connotes increased as against disordered blood destruction. Supposing that there is present only some abnormal disposal of the products of normal hæmolysis, there need be no stimulus to undue new blood formation. Of other cases of insane patients examined at about the same time in the Bethlem Royal Hospital, and previously in other institutions, many showed as large an increase in the red cells, and in these the influence of sulphonal was not in question. The polycythæmia was probably due to a certain amount of stagnation in the capillaries, such as is likely to be present in a typical case of sulphonal poison, and such as is very common in the insane, especially the melancholic.

REFERENCES.

[1] Audry. *Bull. Soc. méd. des Hôp. de Lyon*, 14 Fév., 1902; *Lyon méd.*, 1902, xcviii, p. 288.
[2] Engel. "Leitfaden z. klin. Untersuch. des Blutes," Berl., 1902.
[3] Fells, A. *Bristol Med.-Chir. Journ.*, 1908, xxvi, p. 188.
[4] Neumann, H. *Deutsch. med. Wochenschr.*, Berl., 1894, xx, p. 105.
[5] Wright and Drake. *Trans. Assoc. Amer. Phys.*, 1903, xviii, p. 272.

The Prognostic Significance of Secondary Polycythæmia in Cardio-pulmonary Cases.

By F. Parkes Weber, M.D.

The frequent occurrence of polycythæmia in those cases of congenital heart disease (especially congenital pulmonary stenosis) which are associated with more or less cyanosis, is well known. A few such patients live to adult life, like a young man, aged 22, whom I showed before the Clinical Section of the Royal Society of Medicine in November, 1908,[1] and another young man aged 22, whom I showed, with Dr. G. Dorner, before the same Section in January, 1911.[2] In both communications the nature of the secondary blood changes was specially considered. In my first communication[3] evidence was furnished in support of the modern doctrine that the excess in the number of red blood corpuscles in such cases was largely of a compensatory (conservative) nature; that it was a manifestation of the attempt on the part of the bone-marrow to make up for imperfect oxygenation of the blood and tissues of the body by a numerical increase of the red cells—that is to say, of the oxygen carriers of the blood; that it represented, in fact, a vital compensatory reaction analogous to the increase of the polymorphonuclear leucocytes in the blood, consequent on streptococcal invasions, &c. It was furthermore pointed out that the figures obtained by actual blood counts might make one under-estimate rather than over-estimate the total numerical excess of erythrocytes in the body, for there was considerable evidence indicating that when, in chronic cardiac cases, the erythrocyte count per cubic millimetre of blood was above the normal (relative polycythæmia) the total volume of the blood in the whole body was likewise excessive, a supposition confirmed by the congested appearance of the ears, lips, nose, tongue, and retinæ in many cases.

In the second case[4] (that described in the second communication), additional evidence, pointing to the same conclusions, was obtained by means of the estimation of the total hæmoglobin and total blood volume in the body by Haldane and Lorrain Smith's carbon monoxide method. As concentration of the blood resulting from delayed circulation (stasis) in the capillaries might partly account for the polycythæmia in chronic cardiac cases, we attempted to measure (as I proposed in the first paper) the degree of any such blood concentration (if present) by estimating the total solid residue in the patient's blood serum, just as Weintraud and Senator estimated it in cases of so-called "splenomegalic polycythæmia" or "erythræmia."[1] The results of the various investigations carried out showed that the case was an extreme example of cyanosis and polycythæmia in an adult secondary to congenital heart disease. They showed that the polycythæmia could not be accounted for by concentration of the blood as a whole, though the blood plasma may have been very slightly concentrated, probably as a result of capillary blood stasis. They proved that, as in splenomegalic polycythæmia (erythræmia), not only the number of red corpuscles and the amount of hæmoglobin per cubic millimetre of blood were greatly above the normal, but also the amount of hæmoglobin (as measured by the oxygen capacity) and the volume of blood per 100 grm. of body-weight; there was, in fact, a condition of true plethora (polyæmia) present, so that the degree of absolute polycythæmia was much greater even than the degree of relative polycythæmia. The polycythæmia was doubtless, as in cases of splenomegalic polycythæmia (erythræmia), mainly due to an actual increased formation of red blood cells in the bone-marrow.

---

[1] F. P. Weber, *Proc. Roy. Soc. Med.*, 1909, ii (Clin. Sect.), p. 23; see also *Edinb. Med. Journ.*, 1909, New Series, ii, p. 18.

[2] Weber and Dorner, *Proc. Roy. Soc. Med.*, 1911, iv (Clin. Sect.), p. 85; see also *Lancet*, 1911, i, p. 150.

[3] F. P. Weber, *Edinb. Med. Journ.*, 1909, loc. cit.

[4] Weber and Dorner, loc. cit.

The secondary polycythæmia in cases of congenital heart disease is seldom, if ever, rivalled in degree by the secondary polycythæmia which sometimes, as is well known, occurs in chronic acquired valvular affections (of the mitral valve) and in adherent pericardium. It is more nearly rivalled by the marked secondary polycythæmia which it is my intention to consider in the present paper, occasionally associated with late stages of pulmonary emphysema, chronic bronchitis, asthma, old bilateral pleuritic adhesion, chronic interstitial pneumonia and pulmonary fibrosis; that is to say, it may be rivalled by the secondary polycythæmia in what I term "cardio-pulmonary cases." The polycythæmia in all these groups of cases differs, however, from the polycythæmia (possibly of primary myelogenous origin) associated with chronic splenomegaly, which has been termed "erythræmia,"[1] by the not infrequent absence of real cyanosis in erythræmia, especially in its early stages.

---

[1] *Vide* F. P. Weber: "Polycythæmia, Erythrocytosis, and Erythræmia," *Quart. Journ. of Med.*, Oxford, 1908, ii, pp. 85-134. By analogy with the terms "leucocytosis" and "leukæmia" the term "erythrocytosis" is sometimes employed to signify a secondary ("reactive") increase of the red blood corpuscles, so as to distinguish it from a condition ("erythræmia") in which the increase of the red cells is apparently due to a primary disorder of the erythrocyte-producing tissue of the body.

Is polycythæmia a good or a bad sign in cardiac cases? In my first paper[2] I answered this question as follows: "Just as hypertrophy of the walls of the heart is useful in so far as it compensates for mechanical defects in the valvular apparatus, so also is polycythæmia useful in so far as it compensates for difficulties in the proper oxygenation of the blood and tissues of the body, but just as in cardiac valvular disease great hypertrophy of the heart indicates some grave defect in the valvular mechanism, so also an extreme increase in the number of erythrocytes in the blood points to there being great impairment of the normal process of oxygenation of the body."

With the "cardio-pulmonary cases," however, with which I am chiefly concerned in the present paper, the prognostic significance of the polycythæmia is, I believe, somewhat different, or rather, as I would prefer to put it, the outlook is exceedingly grave at the stage of the disease when cyanosis and a great degree of polycythæmia become striking clinical features. A typical history of the kind of cases to which I refer is somewhat as follows:—

The patient, more frequently a male and at about middle age, has been accustomed to attacks of asthma or bronchitis and has signs of emphysema of the lungs. He has been subject to "colds" and bronchitis in winter, which have frequently lasted a long time. Sometimes there is also a history of past attacks of pleurisy or pneumonia. On the whole, however, he has managed to keep on fairly well with his business and other occupations. But at last, probably during one of his winter attacks, his cyanosis attracts attention and becomes a marked feature of the case. His cheeks, nose, ears, lips, tongue, soft palate and fauces are all livid, and so are his hands, though the degree of blueness varies from time to time, from day to day, or from hour to hour, according to temporary conditions of his circulation, associated with the state of the weather, the temperature of the room, the amount of bronchitis, &c. The conjunctivæ may be reddish and suffused, as in cases of splenomegalic polycythæmia (erythræmia). The short acute paroxysms of asthma, to which he probably used to be subject, become less frequent, or no longer occur. But there is often more or less chronic dyspnœa and wheezy breathing. When his blood is examined there is found to be decided polycythæmia, so that the number of red cells may reach 7 million or more to the cubic millimetre of blood. There is no longer the same tendency to recovery, or the recovery is likely to be only temporary, and an attempt to resume anything like his ordinary mode of life and daily occupations leads to a relapse. The right side of the heart is hypertrophied and more or less dilated, as may be shown by Röntgen ray examination. The brachial systolic blood-pressure is rather low, or at least not excessive, unless there are special complications—namely, decided arterio-sclerosis or chronic interstitial nephritis (as in Case XI) present. The fingers are often "clubbed." Usually the liver becomes enlarged, and often slight ascites develops. Occasionally the ascites may be much greater, needing tapping, and there may be more or less general œdema. With increasing cardiac failure orthopnœa becomes more marked. With increasing cyanosis and chronic carbonic acid poisoning there is often remarkable somnolence and the sleepiness may progress to actual coma (the so-called "cyanotic coma"); towards the end there may be epileptiform twitchings or convulsions. Death may be due to actual carbonic acid poisoning, or to intercurrent broncho-pneumonia or other intercurrent affections, or may be due to gradual cardiac failure. In regard to the ætiology, former abuse of beer or alcoholic drinks sometimes plays a part, in addition to asthma, pulmonary emphysema, chronic bronchitis, old bilateral pleuritic adhesions, chronic interstitial pneumonia and pulmonary fibrosis (which may be partly of chronic tuberculous origin). Arillaga[1] attributes the onset of the cyanotic stage to the occurrence of secondary sclerosis in the pulmonary artery, but I think that this explanation can only occasionally be the correct one, possibly only in exceptional cases. I should like to mention here that, so far as I can judge, the best marked polycythæmic reactions occur in individuals (especially chronic asthmatics) of Jewish race,[2] and at about middle age, when the reactive powers are stronger than in old age.

---

[1] *Vide* F. P. Weber, *Quart. Journ. of Med.*, loc. cit.

[2] F. P. Weber, *Edinb. Med. Journ.*, 1909, loc. cit.

---

[1] *Argentina Méd.*, 1912, p. 521. [I have only been able to see a French abstract of his paper.]

[2] Possibly middle-aged Jews are altogether rather more liable than others to chronic asthma and bronchitis and to a plethoric habit of body—a habit of body which amongst Jews is less often than amongst European races accompanied and relieved by excessively free action of the bowels. Corpulent, plethoric-looking Englishmen and Germans (of the "juicy," "beefy" type) are often accustomed to have two, or sometimes three, evacuations of the bowels every day.

In regard to treatment, some of the cases improve (at least temporarily) under prolonged rest in bed, small doses of potassium iodide, cardiac stimulants, diuretics and expectorants, oxygen inhalation, and perhaps also blood-letting. Following are illustrative cases, in some of which post-mortem examinations were made. The condition of the bone-marrow was examined in one case (Case I), and a decided erythroblastic reaction was found present. This is analogous to the erythroblastic reaction found in the bone-marrow from cases of polycythæmia secondary to congenital heart disease by E. Weil, of Paris,[1] and by L. G. J. Mackey, in England.[2] It is perhaps worthy of special mention that in the following cases nucleated red cells were not seen in the circulating blood, except in one case (Case III), and then only a single one, on one occasion only. The slight leucocytosis observed in some of the cases was probably secondary to bronchitis. Owing to the excess of carbonic acid in the blood of cyanotic "cardio-pulmonary" cases, the blood viscosity is probably increased out of proportion to the increase of red cells in the cubic millimetre of blood.

CASES.

Case I (1906).—M. M., aged 29, a medium-sized woman, who had worked as a book-folder. There was some evidence pointing to previous indulgence in alcohol. A year previously (in the winter of 1904-05) she had had a long illness characterized by shortness of breath and cough, with blueness of the face and finger-nails. Her condition had improved much, however, and the cyanosis had left her. But a few weeks before her admission (December 29, 1905) to the German Hospital the old troubles had returned in a decidedly severer form. On admission there was great cyanosis of the lips, fingers, &c., and some dyspnœa. The superficial veins were very full, and there was slight œdema of both legs. The lungs were emphysematous; there was some crepitation at the base of the left lung, with dry bronchitic sounds higher up. The liver was enlarged. The urine (of specific gravity 1.029) contained a little albumin and a few hyaline casts. Brachial systolic blood-pressure: 105 to 125 mm. Hg. Blood examination (January 3, 1906): Red cells, 6,240,000 to the cubic millimetre of blood; white cells, 8,400. Examination of blood obtained by a small venesection (January 8, 1906) gave: Red cells, 6,350,000 to the cubic millimetre; white cells, 7,400; specific gravity of blood, 1.062.

---

[1] E. Weil, *Compt. rend. de la Soc. de Biol.*, Par., 1901, liii, p. 713.

[2] Mackey, *Birm. Med. Rev.*, 1907, x, pp. 113, 177.

The viscosity co-efficient of the blood was estimated at about six and a half times that of water. Later on (January 23, 1906) the patient died rather suddenly when she was very cyanosed and in a drowsy condition, apparently due to chronic carbonic acid poisoning.

Necropsy: The heart (weight, 15 oz.) showed considerable dilatation of the right side and hypertrophy of right and left ventricles. There were old pleuritic adhesions over both lungs, which were emphysematous and engorged with blood and œdema. The liver, spleen and kidneys showed passive congestion. The left humerus was sawn through horizontally, and the greater part of the bone-marrow of the shaft was found to have a dull earthy-red appearance. Microscopically the bone-marrow showed an increase of the cell elements at the expense of the fat vesicles. This cellular reaction was in great part an erythroblastic one.

Case II (1905).—A. S., aged 32, a joiner. He gave a history of having had a cough for the last six months or so, but he had remained at work till two weeks before admission, when he commenced to suffer from severe shortness of breath, with slight swelling of the legs. On admission (April 3, 1905) the patient, a strongly built man, had cyanosis and dyspnœa, with a little œdema of the lower extremities. His lungs were emphysematous, his liver was somewhat enlarged, and there was apparently very slight ascites. The urine (diminished in quantity) contained a trace of albumin. There was no fever. Pulse 94, regular, and of rather low pressure. Respiration, 36. Ophthalmoscopic examination showed great hyperæmia of the retina and there was one retinal hæmorrhage in each eye (Dr. R. Gruber). The blood (April 6) showed marked polycythæmia; there were 8,400,000 red cells to the cubic millimetre of blood from the lobule of the ear. The examination of blood obtained by a small venesection on April 10 gave: Red cells, 6,850,000 to the cubic millimetre of blood; specific gravity (pyknometer method), 1.073. The viscosity co-efficient (estimated at 19° C.) was greatly in excess of the average. Some hours later the capillary blood from the finger was found to contain 8,150,000 red cells to the cubic millimetre. On April 24 the capillary blood contained 9,470,000 red cells to the cubic millimetre of blood; the white cells numbered 9,200; and the hæmoglobin was 155 per cent. The differential count of white cells (two occasions) showed nothing special. The treatment was chiefly by rest in bed, oxygen inhalation (at first), small doses of potassium iodide and ammonium carbonate, Guy's pills and small powders of camphor and benzoic acid. His general condition improved very greatly, and he was allowed to get up in the ward and also to walk in the garden; the daily quantity of urine increased; his dyspnœa diminished; gradually his cyanosis and polycythæmia diminished likewise. The red cell counts per cubic millimetre of blood were as follows: May 1, 8,400,000; May 10, 8,144,000; May 23, 7,712,000; May 29, 6,800,000; June 7, 6,312,000; June 14, 7,862,400; June 29, 5,625,000. When I saw the patient on June 29 he had been taking no medicine for the last two weeks. There were a few dry bronchitic sounds to be heard over his lungs. There was no cyanosis. Respiration 25, pulse 72. The brachial systolic blood-pressure was 140 mm. Hg. (It had previously varied between 110 and 135 mm. Hg.) In this case it is worth mentioning that Dr. A. E. Boycott on two or three occasions kindly examined blood films for the presence of nucleated red cells, but with negative results. After June, 1905, the patient was unfortunately lost sight of.

Case III (1912).—T. H., aged 42, a railway labourer. A powerfully built man with slight congenital ichthyosis (a familial complaint in his family). His father was said to have died of bronchitis and heart disease, and his mother of bronchitis. In childhood the patient had had measles and whooping-cough, and in adult life he had often had bronchitis. He had always tended to be "short of breath." He thought that he had always been moderate in alcohol. Two years before admission he had had pneumonia or pleurisy on the left side. Seven weeks before admission he suffered from a "cold" with shivering. On admission there was much cyanosis of the face and hands. Pulse 102, respiration 30, temperature 99° F. The cardiac dullness was enlarged to the right, but the heart was evidently covered by emphysematous lung to the left, and the apex beat could not be felt. The heart-sounds were muffled; there were no murmurs. The veins in the neck were distended. The lungs appeared emphysematous, and there was some dullness at the base of the left lung. There was slight ascites, and the liver and spleen could not be distinctly felt. The urine, of diminished quantity, was of high specific gravity and showed a trace of albumin. Brachial systolic blood-pressure: 110 to 116 mm. Hg. Blood examination: Hæmoglobin, 95 per cent.; red cells, 6,533,000 to the cubic millimetre of blood; white cells, 8,000. The patient remained in the hospital from March 19, 1912, to his death on August 13 of that year. Diuretin, digitalis, strychnine, small doses of potassium iodide, and oxygen inhalations were tried. The oxygen inhalation (the oxygen was inhaled after passage through warm water) seemed to make little difference. The digitalis likewise did no good. He was tapped occasionally for left pleural effusion, for ascites and for subcutaneous œdema in the lower extremities. For a time there were crepitations at the base of both lungs and œdema of the trunk and lower extremities. A striking feature of the case was the patient's somnolence: apparently as a result of chronic carbonic acid poisoning he tended to sleep at all hours of the day and night. At one time his general condition greatly improved and he was allowed up in the ward, but suddenly he was seized with epileptiform convulsions,[1] followed by coma and death. A venesection did not help. The highest count of the patient's red cells was on June 7, 1912 (Dr. G. Dorner), when they numbered 7,253,300 to the cubic millimetre of blood. On that occasion the hæmoglobin was only 80 per cent. (by Sahli's hæmoglobinometer), and the white corpuscles numbered 4,700 to the cubic millimetre of blood. Microscopic examination of stained blood films showed slight anisocytosis, poikilocytosis, and polychromatophilia; one nucleated red cell was seen.

---

[1] It may be noted that a brother of the patient is apparently subject to true epilepsy.

The necropsy showed enlargement of the heart (weight, 19 oz.), relative insufficiency of the mitral valve, but no true valvular disease and no congenital malformation. There was much pleuritic adhesion on the left side and apparently commencing pneumonia of the lower lobe of the left lung. The right lung was very emphysematous. The liver was "nutmeggy" and the other abdominal viscera were engorged with blood.

Case IV (1904).—A. W., a strongly built man, aged 26. On admission: Dyspnœa, orthopnœa, great cyanosis, engorgement of the venous system generally, especially of the veins of the neck, some ascites, œdema of the lower extremities. The heart sounds were weak; no distinct murmur. There were signs of pulmonary emphysema, and wheezing sounds were heard by auscultation. The liver and spleen were not felt. The urine was concentrated, and contained a little albumin. There was no fever. The patient had apparently always been subject to attacks of bronchitis, &c. he was said to have had "weak" lungs. His present severe illness was stated to have commenced eight or nine months previously, and to have become much worse since then. In the hospital the cyanosis, orthopnœa, and œdema increased, and at last the patient fell into a comatose state, apparently due to the chronic carbonic acid poisoning. The blood showed decided polycythæmia. At the end there were slight epileptiform twitchings in both arms, and slight rise in temperature.

The necropsy showed a heart weighing 18 oz., with much hypertrophy and dilatation of the right side; the veins of the surface of the heart were distended with dark blood; there was no evidence of any endocarditis, pericarditis, or congenital malformation. Both lungs showed emphysema, chronic congestion, œdema, and partial collapse. There was much old pleuritic adhesion on both sides, and some serous effusion in the right pleura. The liver was "nutmeggy," and the spleen was of the firm "cardiac" type. The kidneys were somewhat large, and apparently not diseased.

Case V (1904).—A. K., aged 42, a Russian-Jewish cap-maker. Apparently a somewhat similar case to that of A. W. (Case IV), but, unfortunately, no blood count was made. During the last days of life there was a semi-comatose condition, apparently due to chronic carbonic acid poisoning. The history was that for the last four years of life the patient, a rather thin man, had suffered from cough and respiratory trouble.

Necropsy: The heart (weight, 13 oz.) showed dilatation and hypertrophy of the right side. Both the lungs were more or less adherent to the chest-walls; there was a good deal of chronic interstitial fibrosis, and some obsolete remnants of tuberculosis were noted. The liver, spleen, and kidneys showed chronic congestion. The mucous membrane of the stomach and small intestine was engorged with blood, apparently as the result of passive congestion, and the stomach and intestine contained slightly altered blood, as if bleeding from the engorged mucous membrane had occurred a little before death.

Case VI (1906).—T. L., aged 39, a joiner, a strongly built man. At about the age of 29 he had commenced to suffer from shortness of breath (asthma ?), which he himself attributed to the practice of "coitus interruptus." Since then the respiratory trouble had gradually increased, and there had been occasional exacerbations. From the age of 14 he had been a cigarette-smoker, smoking eight to ten cigarettes a day. No history of alcohol or syphilis. On admission (December 29, 1906), the patient had the physical signs of pulmonary emphysema and bronchitis ; there were dry and moist bronchitic sounds. Dyspnœa, orthopnœa, cyanosis. No fever. The liver was somewhat enlarged, and there seemed to be a little ascites. The fingers were "clubbed." The urine (diminished in quantity) was free from albumin and sugar. There was muco-purulent expectoration, free from tubercle bacilli. The brachial systolic blood-pressure was 105 to 110 mm. Hg. The capillary blood from a finger showed great polycythæmia ; the red cells numbered 9,357,000, and the white cells 11,300 to the cubic millimetre of blood ; the hæmoglobin (by Haldane's method) was 115 per cent. Under treatment, by rest in bed, small doses of potassium iodide and tincture of lobelia, Guy's pills, oxygen inhalation, and inhalations of Friar's balsam, improvement took place. In the second week of February, when he left the hospital, there was still some crepitation over the lower portions of the lungs, and there was some muco-purulent expectoration. Respiration about 21 ; pulse about 100. The radial arteries felt decidedly thickened and somewhat tortuous, but the brachial systolic blood-pressure was rather low (about 115 mm. Hg.). The liver was apparently no longer enlarged. The amount of urine was rather above the average. The red cells numbered only 6,930,000 in the cubic millimetre of blood. His conjunctivæ had lost much of their congested appearance. The improvement, however, did not last long.

Case VII (1910).—W. D., aged 35, a slipper-maker, who for the last seven years before admission had been subject to "asthmatic" attacks. In the hospital there were great cyanosis, with dyspnœa, some "clubbing" of fingers and toes, and slight œdema of the feet and the lower part of the body. There was crepitation over the lower portions of the lungs. The heart was enlarged to the right, and there was an apical systolic murmur and a double murmur at the base. The liver was enlarged, and there was slight ascites. The urine contained a trace of albumin. Brachial systolic blood-pressure 110 mm. Hg. Blood examination (Dr. Dorner, November 28, 1910) : Hæmoglobin (by Sahli's method), 135 per cent. : red cells, 7,683,300 in the cubic millimetre of blood ; white cells, 9,500. The coagulation time (by Sir A. E. Wright's coagulometer) was ten minutes. According to Determann's clinical viscosimeter, the blood viscosity was greatly above the normal. The patient became less cyanotic, but was very feeble. Œdema had to be drained out of the lower extremities. He died a month after admission.

Necropsy : The heart (weight, 16 oz.) showed great hypertrophy of the right side, so that the two sides were nearly similar in appearance. The mitral valve showed old thickening and retraction, and slight recent vegetations. Both pleuræ were almost universally adherent, and both lungs were emphysematous. There were some embolic infarctions in the right lung and some chronic fibrosis of the upper part of the left lung (not obviously tuberculosis). The liver was "nutmeggy," and the spleen small and firm, of the "cardiac type." All the viscera were greatly congested.

Case VIII (1904).—S. R., aged 33, a married woman. I am indebted to my colleague, Dr. Karl Fürth, for his kind permission to quote this case. There was some evidence pointing to previous indulgence in alcohol. The patient was much cyanosed, and the blood (twice examined) showed polycythæmia. The hæmoglobin was about 130 per cent.; the red cells numbered about 7,000,000, and the white cells about 11,000 to the cubic millimetre of blood. There were crepitations over the lungs. A cardiac systolic murmur was best heard between the apex and the sternum. The edge of the liver could be felt reaching to below the umbilical level. The spleen seemed also to be enlarged, but the edge could not be felt. The urine, diminished in quantity, showed a little albumin and a few tube-casts. Ascites developed, and also a suffocative pulmonary condition, which was followed by coma (probably a result of carbonic acid poisoning). A moderate venesection (about 10 oz.) did little, if any, good.

Necropsy: The heart (weight, 17 oz.) was hypertrophied, chiefly on the right side. Both tricuspid and mitral orifices were dilated, and the free borders of both these valves appeared somewhat thickened. Both lungs showed emphysema, bronchitis, and congestion, and (by microscopic examination) a certain amount of chronic indurative pneumonia. There were pleuritic adhesions on both sides, which could, however, be separated. The liver (weight, 88 oz.) was "nutmeggy," and the spleen (weight, 16 oz.) was enlarged and (by microscopic examination) much congested. The kidneys (weight together, 16 oz.) were rather large and (microscopically) showed passive congestion.

Case IX (1906).—A. J., aged 28, a waiter. For about the last nine years he had been subject to attacks of asthma, which at first recurred every two or three weeks, afterwards more frequently. Of late, however, he had had no regular attack, but continuous shortness of breath. In the hospital he had cyanosis and the signs of pulmonary emphysema, enlargement of the liver, ascites, œdema, and slight albuminuria. There were crepitations at the base of both lungs and a systolic murmur at the apex of the heart. Blood examination (November 29, 1906): Hæmoglobin (by Haldane's method), 115 per cent.; red cells, 6,870,000, and white cells, 11,300, to the cubic millimetre of blood. He had improved during a first stay in the hospital (March to April, 1906), but did not do well when readmitted in November, 1906. He died in December, 1906.

Necropsy: The heart showed much hypertrophy and dilatation of the right side; the wall of the hypertrophied right ventricle was almost equal in size to that of the left ventricle. The lungs were emphysematous and the dependent portions were much congested. The liver was enlarged and showed passive congestion. The spleen was firm and of the "cardiac type."

Case X (1904).—F. J., aged 22. A rather fat and plethoric-looking woman, under the care of my colleague, Dr. Fürth, who has kindly allowed me to mention it. There was a history of previous rheumatism. Her heart was overlapped by emphysematous lung. The liver was much enlarged. The urine was free from albumin and sugar. The red cells numbered 6,500,000 in the cubic millimetre of blood.

Case XI (1910).—P. E., aged 48, a baker, a fat, plethoric-looking man, whose illness was said to have commenced six weeks previously with dyspnœa and cough. The venesection blood contained about 6,200,000 red cells to the cubic millimetre, and its viscosity value (as estimated by Determann's clinical viscosimeter) was about 8·3 times that of water (both at 20° C.). The case was, however, complicated by nephritis and high blood-pressure (the brachial systolic blood-pressure was 200 mm. Hg.). I am not sure whether it really belonged to the present class.

DISCUSSION.

Dr. ROBERT HUTCHISON said the difficulty which he found about discussing this subject was that polycythæmia was such a heterogeneous manifestation, and meant such different things in various cases. This fact was very well shown in Dr. Gordon Ward's collection of cases, in which he showed it to be associated, either accidentally or otherwise, with a large number of different pathological conditions. The first point to be settled was, what were the limits of normality in the number of red cells? He was sure there were many healthy people with a six-million red cell count, and would hesitate to say that this indicated anything abnormal in the blood, particularly when it was not accompanied by any great excess of hæmoglobin. It was one of the difficulties in discussing the subject, that we did not yet know how many red cells a man might have and still be normal for all practical purposes. Then there was the difficulty, which had not yet been entirely got over, of local stagnation or concentration of the blood in the periphery; and one must always remember the fallacy that where local cyanosis existed in the extremities, the sample of blood withdrawn therefrom might not necessarily be a fair sample for the body generally. To take first Dr. Ward's paper. He supposed the first group, the congenital cases, were those associated with congenital heart disease. In examining the blood of the newly born he had always found an excess of red cells, the number being considerably above the normal in the first few days after delivery, and the blood showed a large number of normoblasts. He supposed this was because the oxidation of the blood *in utero* was not easy, and there was a kind of compensatory excess of red cells, which took some time to disappear. That it would not disappear at all in congenital heart disease one could imagine, because in that case the difficulty in oxidation was not merely *in utero*, but persisted after birth. With regard to the idiopathic cases, if one took a series of persons and examined their blood, one would find in a definite proportion of them red cells running up almost as high as in the idiopathic cases which Dr. Ward included in his collection. Some of Dr. Ward's cases were compensatory ones, very much as Dr. Parkes Weber had described. The "reactive" series were very interesting, especially the way in which the hæmoglobin lagged behind the red cells. He had noticed clinically that a person who had had a huge hæmorrhage, for example from the stomach, continued to look anæmic for a long time after the resumption of the normal red cell count, the reason being that the restoration of the hæmoglobin came last, though the cells were quite ready to receive it earlier. He supposed the explanation which had been advanced was right—namely, that the bone-marrow rather overdid its effort, and that there was a swing of the pendulum beyond the point of compensation. As to the last case, he was inclined to disagree with Dr. Ward and to believe that the sulphonal had something to do with it. If sulphonal destroyed hæmoglobin and produced hæmatoporphyrin, the oxygen-carrying power of the blood was, *pro rata*, diminished, and one would expect a reaction to that on the part of the bone-marrow. With regard to Dr. Parkes Weber's paper, it seemed to him that Dr. Weber was describing a group of cases which were very common, and there need be no surprise that most of the cases did not get beyond middle life, as the majority were killed off before arriving at old age. He submitted that Dr. Weber's paper did not tell one any more than this: that the more cyanosed a person was the worse was his outlook as regards life, and that had been recognized in the profession for a very long time. Perhaps, however, counting the cells was a more accurate way of showing this. Yet at present any refinement in prognosis afforded by the method just detailed did not seem to justify the additional trouble in using it.

Dr. JOHN PARKINSON said he was interested in seeing the classification of cases which had been brought forward, though that class of case had scarcely come into his work. He had been impressed by the enormous number of red cells in primary erythræmia. But he had found, in examining the blood in secondary erythræmia, that the counts might be very high indeed. The striking thing about Dr. Ward's list was how relatively few were the red cells; and he agreed with Dr. Hutchison that the number of red cells in the normal individual might be about 6 million without any degree of pathological erythræmia being present. He was interested in the doubtful case (No. VI), but there again the blood count was only 6½ million. He would like to know from Dr. Parkes Weber whether estimations had been made of the total volume of blood in secondary erythræmia, by the Haldane and Lorrain Smith method. Some thought it would prove a method of distinguishing secondary erythræmia from primary, but apparently that was not so in some cases Dr. Weber mentioned, and in others which he quoted. He considered that the difficulty of distinguishing the primary from the secondary cases was almost insuperable, except by failing to find a definite cause. Through the kindness of Dr. Hutchison he had published among his cases of erythræmia one in which subsequent autopsy showed stenosis of the portal vein, leading to congestion of the whole portal area. During life it had been impossible to distinguish it from primary erythræmia.

Dr. A. M. ELLIOT said that only two points in the papers appealed to him, one of which had been alluded to by Dr. Hutchison. While in India, he had done a great deal of blood examination; and he had been taught—and came to the same conclusion from an examination of many thousands of cases—that until there were over 7 millions of red cells, the condition could hardly be considered pathological. Any number between 4 million and 7 million might be taken as normal. In one of his slides, Dr. Gordon Ward had pointed to a rosette-shaped corpuscle, which he was inclined to think was peculiar to certain heart conditions. This exact appearance had been seen many times in malarial, typhoid, and other conditions, and Dr. Elliot was of opinion that it was not connected with any disease, but merely due to artefact.

Dr. BATTY SHAW said he felt much interested in the group of cases brought forward by Dr. Parkes Weber, and was tempted to ask whether Dr. Parkes Weber had entertained the question of the advantage of venesection in these cases. If there was a plethoric reaction in the blood provoked by the chemical needs of the body, then perhaps after all it would be found to be the truth that bleeding instead of being beneficial in such cases—a clinical impression which was very commonly believed in—was harmful. It was possible of course to escape from this apparent paradox by invoking a mechanical overstrain of the heart, an overstrain which was the direct result of the benign plethoric condition of the circulation, and which could be relieved by the removal of blood. More facts, however, were needed as to the existence of this overstrain. With regard to Dr. Ward's series of cases, he had apparently found what was a common experience, that polycythæmia was not in all cases accompanied by an erythroblastæmia—the so-called blood crisis, now exceptional rather than the rule. Such knowledge raised the question whether a beneficent response on the part of the blood-forming tissues was a reality, whether there was not some other mechanism at work, possibly chemical, which led to the presence of more red corpuscles in the blood—an erythrocythæmia, not a mixed erythrocythæmia and erythroblastæmia. The difficulty was got over by supposing that the call upon the blood-forming tissues was of different degrees in different cases.

The PRESIDENT (Dr. Frederick Taylor) asked if Dr. Ward had had any estimates of the volume of blood in his cases. It seemed to him that the facts ascertained by the methods of Professor Haldane and Professor Lorrain Smith with regard to alterations in the volume of the blood had a very large bearing on all this work. It was such a great revolution in one's previous ideas, as regards chlorosis for instance. It had been shown that in this disease the volume of the blood might be two and a half times the normal, and that therefore the corpuscles in a case of chlorosis might be really much more numerous in the whole body than in the normal person. In other words, the person with chlorosis had a polycythæmia; and something similar was the case in pernicious anæmia, except that in the latter the number of corpuscles per cubic millimetre being much smaller, and the volume of the blood less, the cases could not be said always to have attained to polycythæmia. He thought that all the observations on polycythæmia should be checked with regard to this point. Dr. Parkes Weber had checked some of his cases in this way. Another thing he would like to say was that he was not quite satisfied with the teleological explanations of the changes in the bone-marrow which occurred in this and other blood diseases. These explanations assumed spontaneous and ingenious efforts on the part of the bone-marrow to set things right in the blood. The same regenerative efforts were recognized in the case of pernicious anæmia, yet how different were the results. His attitude was only one of inquiry, but he thought there was need of a good deal more knowledge before one could feel happy about the extremely interesting class of case which Dr. Ward and Dr. Parkes Weber had brought forward, and for which the Section was indebted to them.

Dr. GORDON WARD, in reply, said none of his cases had been checked by the carbon monoxide method. Several of them were insane, and the method would not have been applicable. Nor was it possible to employ it in such cases as those of heart-failure or acute Addison's disease. The carbon monoxide method, in fact, had a very limited clinical application. On the other hand, he had looked for, and wherever possible recorded, any signs of increased blood volume, such as enlargement of the conjunctival vessels, or such signs of rapidly varying blood volume as were afforded by sudden and considerable changes in the number of red cells per cubic millimetre, although there were no signs of red cell destruction. He quite agreed with the President that, at present, we knew very little about polycythæmia, and could hope to know very little until some method of estimating the blood volume was devised which should be generally applicable in practice. Meanwhile he had merely set down the facts as far as he had been able to elucidate them in the cases recorded. This he did, not because he thought he could make useful comments on them, but in case they might be of assistance to future investigators. Dr. Hutchison had suggested that in the first two cases the persistence of an embryonic type might be explicable by the heart lesion. He did not desire to dogmatize from two cases, but still felt more inclined to his own interpretation of the facts as showing a congenital lesion not necessarily dependent on the heart lesion, and frequently not associated with congenital heart lesions, even at a very early age. He admitted that many of his cases did not show a greater number of red cells than was normal for some individuals, but suggested that in most of the cases the number was clearly not normal for the individual dealt with, and that, moreover, if normal persons differed in the number of their red cells by 2 or 3 million—i.e., from 4 to 7 million—there was in this fact alone ample cause for further investigation; in which case the higher counts could only be referred to as polycythæmia. Dr. Hutchison also considered that the case of sulphonal poisoning probably owed some at least of the polycythæmia to the blood destruction induced by the excess of sulphonal. If sulphonal really did produce excess of blood destruction, Dr. Hutchison's theory as regards this case was a very probable one, but he was inclined to think that sulphonal rather disordered than increased blood destruction, in which case the polycythæmia must presumably be explained on other grounds. There was evidently a tendency amongst those present to consider that the presence of blood destruction, or of the need for increased tissue oxygenation, was not sufficient reason to adduce for the presence of a polycythæmia. He wished to make it plain that he only related what appeared to be cause and effect on the *post hoc ergo propter hoc* principle. He believed that just as certain drugs produced overaction of certain glands by some biochemical means which we were unable to demonstrate, so also the products of blood destruction or the presence of excess of CO_2 might set up a train of biochemical reactions, having as a result polycythæmia. He agreed that we could not say that we had properly explained any case of polycythæmia until we could demonstrate these reactions and looked forward to the time when this would be possible.

Dr. PARKES WEBER, in reply, said both Dr. Hutchison and Dr. Elliot had referred to the variability of the blood count in apparently healthy people. He was inclined to agree that a blood count of 7 million red cells to the cubic millimetre was about the limit consistent with apparently average health; but in regard to patients in hospital many of them had grave pathological conditions (such as more or less purulent bronchitis), which of themselves inclined the patients to anæmia. In such cases, to get an idea of the real degree of polycythæmia, one would have not to be satisfied with the relative polycythæmia—i.e., counting the red cells in a cubic millimetre of the blood—but one would have likewise to estimate the total volume of blood in the body. He believed that, owing to engorgement of the vascular system, many chronic bronchitics with only 5 million red cells to the cubic millimetre of blood had a decided polycythæmia. In such a person, therefore, a blood count of 6 to 7 million reds would constitute a still more decided polycythæmia. Dr. Parkinson asked whether in secondary polycythæmia he had made estimates of the total blood volume. He had referred to that in the paper in reference to the subject of polycythæmia secondary to congenital heart disease. Dr. Batty Shaw had alluded to the question of blood-letting in secondary polycythæmia. Sometimes an excessive polycythæmia and plethora formed part of a "vicious circle." When there was great engorgement with blood he (Dr. Weber) did not doubt that bleeding was useful for occasional emergencies. Venesection had, of course, often been performed in such cases before the days of blood counts. Heroic bleeding in cases of secondary polycythæmia he did not advocate, nor even in primary polycythæmia, though he knew of very copious blood-letting having been carried out in cases of "erythræmia" with apparent benefit. He agreed with Dr. Batty Shaw that it was remarkable that only in a few cases of any kind of polycythæmia (including "erythræmia") did one come across nucleated red cells in the circulating blood, unless, perhaps, in cases of secondary polycythæmia in very young children. He was rather disappointed that Dr. Ward had in his list only one case of erythræmia, and that a doubtful one. The prognosis in genuine erythræmia cases required special investigation. He had reliable information that one of the first two cases he described[1] was still living and in fairly good health. He (Dr. Weber) believed that no case of polycythæmia ought to be classed as an instance of erythræmia without hesitation unless the patient also had an enlarged spleen; splenomegaly was almost a *sine qua non* in the diagnosis of erythræmia.

---

[1] The case of a Roumanian-Jewish woman, then aged 37, described in the *Med.-Chir. Trans.*, Lond., 1905, lxxxviii, p. 191.

Medical Section.

April 22, 1913.

Dr. Frederick Taylor, President of the Section, in the Chair.

Gout and Chronic Rheumatism: Their Ætiology from the Bacteriological Standpoint, and some Notes on Treatment.

By H. Lyon Smith, M.D.

In the new Research Hospital at Cambridge there is a collection of bones and joints, modern and prehistoric, showing the destructive changes which may result from chronic rheumatoid and gouty conditions. Strangeways, who has made this very complete pathological collection, is working at the subject from the standpoint of histological changes, and hopes to prove the mystery of these crippling diseases by working backwards from these "end" conditions. Without belittling the value of pathological histology in the study of the subject, one cannot refrain from pointing out that histology has not done much in the last fifty years to improve our methods of treating these conditions. One is tempted to ask if it would not be more reasonable to take up the investigation of the subject in its earlier stages and endeavour to prevent the formation of these pathological specimens which adorn the Cambridge and other pathological museums. Are the causes chemical, physical, parasitic, or neuropathic?

In an address given last year[1] Garrod, speaking of these subjects, said: "We must not expect from chemical studies more than they can reasonably be expected to give. Unlike the bacteriologist who deals with the actual causæ causantes of many morbid states, the chemical pathologist can only study the response of the organism to morbific agencies. He can tell so much concerning the forms which disease takes and the origin of symptoms, but comparatively little as to the actual causation of maladies." This opinion from so good an authority has encouraged me to lay before the Section the results of my own observations during the three years in which I have investigated the subject bacteriologically.

---

[1] "Where Chemistry and Medecine Meet," *Brit. Med. Journn.*, 1911, i, pp. 1413-18.

In about 175 cases of gout and chronic rheumatism, the points of resemblance rather than the points of difference when studied from the bacteriological point of view have impressed themselves upon me strongly. They may both be regarded in the light of infections of a chronic nature. The nature of the infection may vary enormously, and it is uncommon to find two cases presenting identical infections with identical symptoms. It is not proposed to offer any definition or description of gout or chronic rheumatism, as we may assume that we agree on the classical definitions. Probably the time is not far distant when many of the old clinical terms will be replaced by names which express more accurately the nature of the malady.

The chain of evidence which I bring in support of my theories, consisting as it does in most of the cases of symptoms, subjective and objective, bacteriological findings, and the result of the treatment by immune sera or vaccines, has many missing links. I have made no attempt at the artificial production of gout or chronic rheumatism by the various microbes which I have found in association with them. The specific immunity of different species of animals is well known; certain microbes which we know will produce very troublesome symptoms in human beings are not toxic to certain laboratory animals. They do not kill the animal nor produce distinctive lesions, but we have no evidence that they do not suffer from these experiments in some way which they are unable to express. The pure laboratory worker is fond of saying that clinical experience is fallacious, but I think we may safely accept as evidence many of the statements of educated people who, having experienced over long periods trouble from gout or chronic rheumatism, have been convinced that immunizing methods have given them more relief than other forms of treatment. Gout and chronic rheumatism usually present one or other of the following train of symptoms—arthritis, single or multiple, or peri-arthritis. The neuralgias form another group generally depending upon that condition in which painful subcutaneous swellings can be felt; these thickenings, which Stockman and others have termed "fibrositis," are, I believe, due to inflammatory infiltration of connective tissues. I have not made incisions or obtained any histological specimens of these swellings, and

I am not prepared to state whether they are fatty in constitution, as some believe, or whether they are really thickenings of connective tissue. In many cases they seem to me to be too brawny in structure to be pure adipose tissue; probably there is a mixture of two conditions. At any rate, I have seen them disperse under treatment, and with their dispersal pain and stiffness of the limb have disappeared. Occasionally I have noticed some puckering of the skin after their dispersal. With the phonendoscope placed over muscle plains in painful areas, crepitations can often be heard which suggest an inflammatory condition between the muscle and its sheath—a similar condition to that observed in inflammation of other serous membranes.

The common link in the ætiology of gout and chronic rheumatism is a lowered resistance to some common pathogenic organism which allows an invasion to take place. The site of the battle is generally determined by local causes—for example, an area exposed to the depressing effect of chilling draughts will favour the development of a neuritis, though the causal infection may have occurred at some remote part of the body. We find many examples of this type in people who travel in open motors with inadequate protection from the wind. I have come across many cases of cervical neuritis in gouty people where this appeared to have been the exciting cause. Again, one meets with excessive fatigue of certain muscles or joints as the exciting cause, as in the tennis elbow. The gouty or rheumatic person whose legs happen to be of unequal length will usually develop his trouble in the shorter limb which has to support an unfair share of the body-weight. Errors of refraction determine the trouble in the orbital regions.

The associated chronic lesions which I have found serving as foci of infection have been pyorrhœa, chronic pharyngitis, post-nasal catarrh, gastro-intestinal catarrhs, endometritis, urethritis, bronchitis, cystitis, pyelitis, vaginitis, salpingitis, and some form of dermatitis.

As to pyorrhœa alveolaris, there is much difference of opinion as to what really constitutes the condition. Some men will not admit that pyorrhœa exists unless they can squeeze out visible drops of pus from the gums. This is really an advanced state of the disease, and efforts should be made to try and prevent it reaching this condition. In the earliest stages of pyorrhœa the changes are almost microscopical. Instead of the thin margin of pale pink, healthy gum closely adhering to the teeth, points will be found either on the outer or inner surfaces where separation has begun, and a fine platinum loop can be introduced into a fossa or recess. Sometimes a reddish crescent borders this affected area, and it may be narrow or broad according to the intensity of the inflammation. If the contents of one of these recesses be smeared upon a microscopic slide, they will be found to contain numerous leucocytes and many bacteria. Most of the leucocytes are polynuclear and may exhibit varying degrees of phagocytosis which may give some clue to the patient's index with regard to the contained organisms. These bacteria include several of the most active members of the common pathogenic organisms; it is usual to hear them summarily dismissed as " members of the common flora of the mouth." Saprophytic they may be up to a certain point, but many of them are always ready for mischief, and in any case, if the host should experience adverse conditions such as want, worry, exposure to extreme fatigue, or violent changes of temperature, these microbes which may have been kept in check by his natural power of resistance, take prompt advantage of his weakness and invade him with a virulence which is only modified by his reserve resistance.

I have heard the opinion expressed that Goadby has exaggerated the importance of pyorrhœa in the ætiology of gout and rheumatism, but my experience has convinced me that it is not so. I certainly urge that the microscope should be brought into use before it be definitely stated that pyorrhœa is absent. I have not met with a single case of gout or rheumatism in which there was not some degree of gum infection. On the other hand, many of my patients had lost a number of their teeth and some had had all their teeth removed on account of this very condition. Unfortunately, the operation had not resulted in curing the patient of arthritic trouble.

Chronic inflammatory states of the nasopharynx form another group of lesions which have a good deal to do with gout and rheumatism. The so-called gouty throat usually presents flattened granular patches which contain in their recesses swarms of streptococci similar in type to that with which Poynton, Paine, Goadby, and others, have been able to reproduce arthritis experimentally in animals. From patients with chronic post-nasal catarrh a thick, glairy mucus can be obtained from the posterior nares, and this will generally yield numerous pneumococci, streptococci, Friedländer's bacillus, *Micrococcus catarrhalis* or *Bacillus influenzæ*. More than twenty years ago, Mantle, of Harrogate, drew attention to throat infection in cases of acute rheumatism, and isolated a diplococcus similar to that which he had found in the tonsils, from the fluid effused into the joints in his cases.

My experience of gastro-intestinal catarrh as a focus of infection in rheumatism is not great. It is more troublesome to investigate than the more accessible parts of the body, and I am inclined to believe that the organisms which produce chronic catarrhal conditions in its upper reaches may generally be found in those other catarrhal areas, the stomach or colon, as the case may be. As an example of this, I remember a case of a lady who had suffered from colitis for ten years, but came to me for treatment of her chronic post-nasal catarrh. For this I used autogenous vaccines—pneumococcal, streptococcal, staphylococcal, Friedländer, and catarrhalis, each in their turn, with considerable relief to her post-nasal catarrh; but her colon catarrh, which had not been considered in the treatment, showed a marked improvement long before the post-nasal affection.

Chronic urethritis, which is often kept up by organisms other than the gonococcus, may form the focus of chronic rheumatism or gout. Its upward extension to bladder and ureters, though it may widen the field of action does not alter the method of investigation. Chronic uterine trouble is a common source of infection in women, and some years ago Oliver Sunderland, of Bexley Heath, was successfully treating severe cases of chronic rheumatism by the methods which he adopted for the relief of the uterine catarrh.

The commoner pathogenic microbes which I have met with in my cases are: the streptococci, staphylococci, the *Bacillus coli* group, pneumococci, *Bacillus influenzæ*, the diphtheroid group, gonococci, *Micrococcus catarrhalis*, *Bacillus tuberculosis*, *Micrococcus melitensis*. At the onset of my investigations I was under the impression that there was a specific organism responsible for all cases of rheumatoid arthritis and that it was the so-called *Diplococcus rheumaticus*. A few early successes with inoculations against this organism in quite small doses misled me into thinking that the solution of the problem was going to be fairly simple, but I soon met with cases in which, though I found the organism which I suspected of being the prime cause, I could obtain no satisfactory response to inoculations with it. Further investigations have shown me that the staphylococcus, *Bacillus coli*, pneumococcus, *Micrococcus catarrhalis*, some of the diphtheroid group, and last but not least the influenza bacillus, may each play a definite part in the production of symptoms of either gout or chronic rheumatism. The commonest are the acid-forming bacteria which play such an active rôle in the production of dental caries—i.e., *Streptococcus brevis*, *Staphylococcus albus* and *Staphylococcus aureus*, and probably some of the sarcina group.

Organisms like the influenza bacillus, the pneumococcus, and some of the diphtheroid group, act indirectly by the depressing influence of their toxins upon phagocytosis in general.

Clifford Allbutt drew attention to mental anxiety as a cause of granular kidney some years ago, but I think that the psychological factor in the case could only act as a depressant of normal phagocytosis, and that the actual mischief in the gouty kidney was the result of some microbic infection.

Metchnikoff (in his "Prolongation of Life") has shown what powerful factors optimism and pessimism may be in raising or lowering phagocytosis, and the whole teaching of his work appears to indicate a belief in the microbic origin of senile changes. There is a close resemblance between senescence and advanced conditions of gout and chronic rheumatism. The loss of elasticity in the tissues owing to the deposition of calcium salts is present in both extreme age and in the premature senescence of the gouty sufferer. The degree of this senescence is one of the things which we have to reckon with when we attempt immunizing methods of treatment. The greater the degree of senescence the more difficult it is to obtain a satisfactory response to any form of treatment.

The majority of my cases have been due to mixed infections. Where it has been possible, I have endeavoured to make systematic examination of the blood by means of the opsonic index or the agglutinating reactions of its serum against the different organisms obtained from one or other of the above-mentioned foci, but the labour entailed prohibits these investigations in the majority of cases.

Complement deviation as applied to bacterial infections is equally difficult and complicated. The technique I follow, therefore, is to look for one or more of the associated lesions and examine the pathological exudates from these. I examine fresh films first in order to get some idea of the organisms present before deciding which culture media to adopt for incubation purposes. When one species appears in the fresh film in conspicuous numbers I use inoculations of stock vaccines of what I believe to be the same microbe. They are usually polyvalent and obtained from strains taken from similar cases. For example, in my first case of chronic arthritis I observed large numbers of a Gram-positive diplococcus in the gums, in the throat, and in the uterine cavity. There were chronic inflammatory conditions in these three areas. This streptococcus was associated with an almost equally numerous body of staphylococci, and on treating the patient with a graduated series of the two vaccines combined there was a very marked and rapid improvement in her condition.

The changing phases of certain cases, arising, as so many of them do, from the mixed infections, render it necessary to change one's plan from time to time and attack other organisms when they become very conspicuous in the pathological exudates. In this way I have used in turn, in addition to the above-mentioned organisms, *Bacillus coli*, pneumococci, *Bacillus influenzæ*, diphtheroid bacilli, Friedländer, and *Micrococcus catarrhalis*, before I have been able to make any impression on the symptoms.

Sometimes there occurs a very marked reaction to a certain inoculation, and this in itself forms something of a clue to the nature of the infection. In that case, the second difficulty is to find out the dosage which will give the best result. The individual factor is difficult to gauge, and the vaccines themselves vary extremely in their qualities, though they may have been prepared from apparently identical strains and with the same technique.

In one case, which I saw with Dr. J. R. Bentley, of Limpsfield—a case of chronic rheumatism in a young lady who was subject to acute febrile exacerbations in which many joints became suddenly involved—blood cultures were made with negative results. but because there were typical diphtheria bacilli in fresh films taken from the throat, and because there was a history of a severe attack of diphtheria some years before, the patient's state of health having been unsatisfactory during the whole interval, it was decided to try the effect of diphtheritic antitoxin whilst waiting for the culture results; 1,500 units were injected and a violent reaction occurred, the temperature remaining over 104° F. for forty-eight hours, then it fell to normal, and at the same time there was a sudden marked improvement in all the joint symptoms. I hear from Dr. Bentley that the patient has had one or two similar relapses, but has immediately improved when she has received a dose of antitoxin. This is in keeping with the theory that the immunity obtained from an immune serum is of a passive character and more transient than the active immunity which can be set up against many bacteria by carefully graduated inoculations with vaccines.

During the present year I have come across a good many cases of gout and chronic rheumatism in which *Bacillus influenzæ* were detected in large numbers in the gums, throat, or bronchial secretion, generally in combination with other organisms, and upon adding small doses (usually 16 million) to the other inoculations I have been impressed by the benefit which has resulted.

Authorities differ as to the feasibility of establishing active immunity against certain microbes. For instance, Lehmann lays stress upon the fact that influenza, pneumonia, diphtheria, erysipelas, and gonorrhœa, leave behind them no immunity, but rather leave a predisposition to a second attack. This would naturally discourage us from making any attempt to set up an active immunity by means of vaccines; but other workers have succeeded in producing a certain degree of active immunity with gradually increasing doses of streptococci. Bordet noticed that the sera of such immunized animals could enhance phagocytosis when brought into contact with leucocytes and streptococci. Cantani, Slatineanu and Latapie succeeded in immunizing guinea-pigs against influenza, and some of the animals presented a very marked degree of immunity; but as many of the animals succumbed in the process to the enormous doses which they used, one would hesitate to recommend one's patients to attempt to obtain immunity by the same dangerous path. Fortunately for us, one may obtain marked alleviation of symptoms by inoculation methods which fall far short of complete immunization. I have selected a few typical cases from my notes.

Case I.—A man, aged 42, 5 ft. 11 in. in height, weighing 16 st., with a ruddy, healthy complexion, who complained that he had suffered from gouty symptoms in both feet, hands, and knees, since the age of 16. The right big toe was swollen, moved with difficulty and with a grating sound. He had considerable thickening round the tendo Achillis. Cultures were obtained from recesses surrounding some upper molar stumps; they were full of the organism which Goadby calls *Streptobacillus malæ*, and which appears to be identical with the *Streptococcus parodontalis* of other workers. A vaccine was prepared from this and an initial dose of 15 million was given. There was no unpleasant reaction and the patient felt some relief of symptoms, so the doses were increased in the following order: 25, 50, 100, 150, 200, and at the end of three months he was able to take a dose of 250 millions of this microbe without showing any reaction, although at some of the stages there had been a very marked reaction showing itself chiefly by increased pains, malaise, headache, and even on one occasion a slight degree of anaphylaxis. Improvement went on steadily, and at the end of three months the big toes had become much more flexible. The patient's opinion was that he felt twenty years younger than he did at the beginning of the treatment. It is noteworthy that the tissues round the big toe joints have become much softer.

Case II.—In this the source of infection was an empyoma of the antrum. A lady, aged 45, complaining of neuritis chiefly of the right arm which presented patches of leucoderma and anæsthetic areas. Her antrum had been operated upon two years previously, and was still discharging very offensive pus from which cultures of *Bacillus coli*, *Streptococcus pyogenes* and *Bacillus influenzæ* were isolated. Autogenous vaccines were made and a range of doses beginning with 30 million and reaching up to 250 were given over a period of four months, with the result that the discharge from the antrum is quite cleared up and her neuritis has almost disappeared. I should say that the autogenous vaccine made for her was a combined one, its constituents being approximately *Bacillus coli* 88 per cent., *Streptococcus pyogenes* 2 per cent., *Bacillus influenzæ* 10 per cent. It is rather difficult to estimate these proportions accurately, but by a troublesome method closely akin to Wright's method of standardizing vaccines it is possible to form an approximate estimate.

Case III.—A lady, aged 30, complaining of chronic rheumatism, with a strong family history of gout in the father and bronchial asthma in the mother. Her wrists and ankles were swollen and a good deal of pain and stiffness in many of the muscle plains. She was suffering from chronic post-nasal catarrh. Cultures from this gave pneumococci, *Staphylococcus albus*, the coryzæ bacillus, streptococci, and *Micrococcus catarrhalis*. Over a period of four months she received ten inoculations of these various bacteria, the last inoculation containing 150 millions of mixed strains of streptococci and 150 million *Micrococcus catarrhalis*. The nasal catarrh is completely cleared up and she is quite free from rheumatism. The duration of immunity in these cases appears to depend very largely upon the maximum dose which the patients are able to bear without unpleasant reaction.

Case IV.—This was one of severe arthritis in the knee in a lady, aged 50. The skiagrams showed the presence of bony epiphytes and the knee was surrounded with brawny, painful swelling. Cultures taken from recesses in gold-crowned teeth, from the throat, and from the uterus (which was prolapsed and hypertrophic) gave *Staphylococcus aureus* as the most prominent organism, but pneumococci were also present in the uterus and in the nasopharynx in conspicuous numbers. This patient has received between thirty and forty inoculations over a period of twelve months. The result is that the pain has been very much lessened, she can do a fair amount of walking, and the knee allows movement through an angle of 90°, whereas at the beginning of the treatment it would not move more than 20°. No regular plan of immunizing inoculations could be followed in this case, and the patient's response to the previous doses and frequent examinations of the pathological exudates were taken as a guide to the next step.

Case V.—A lady, aged 32, appeared to be in an early stage of rheumatoid arthritis. There was a strong family history of rheumatic trouble, and patient's symptoms had been present in both knees for over three months. It was difficult to bend them, and painful swellings surrounded the joint. The patient had had prolonged and severe neuritis the year before. The teeth were gouty in appearance, and two lower incisors had been removed for epulis seventeen years before. Had been very subject to rheumatic sore throat. Films from the tonsils showed numerous streptobacilli, and the patient received an initial dose of 10 million. In the course of five months she received twelve inoculations, the last two consisting of 230 million (polyvalent strains), without any reaction. By that time she was quite free from rheumatism, could kneel easily and sit on her heels without the slightest discomfort. For over a year she has had no treatment but has remained perfectly well and able to enjoy her chief hobby, gardening.

It is impossible to summarize or dogmatize on a subject which bristles with so many problems. Its protean aspects suggest a protean ætiology. We do seem to agree that alimentary toxæmia is the probable source from which arise the various symptoms which we designate gout or chronic rheumatism. It can be demonstrated that the ferments produced by certain bacteria acting upon various foodstuffs can, besides the bewildering cleavage of proteids, hydrocarbons and carbohydrates, give rise to the formation of various organic acids—e.g., lactic, acetic, butyric, hippuric, and oxalic. It hardly seems logical to cut down any one section of the diet table in the hope that by starving the host we may kill the parasite. Surely a more rational form of procedure is that which aims at raising the specific immunity of the host to whichever pathogenic bacteria appear to beset him most actively, taking for our models some of the methods which have successfully produced immunities in the research laboratories.

DISCUSSION.

Dr. A. P. LUFF remarked that the author had included in his paper rheumatoid arthritis. He did not know whether he brought it in under the heading of chronic rheumatism; if so, he would dismiss it at once by saying that he believed most workers on the subject were agreed that under the title of rheumatoid arthritis were included many cases of infective arthritis. He believed that cases of so-called rheumatoid arthritis were always infective in origin, though he did not say there was one specific causal organism. Coming to the title of the paper proper, he did not see that Dr. Lyon Smith had adduced direct evidence of microbial infection in these cases. Chronic rheumatism was a very vague term, but he (Dr. Luff) regarded all cases of so-called chronic rheumatism as cases of fibrositis—i.e., cases where there was hyperplasia and thickening of the white fibrous tissue in various parts of the body. What evidence was there that this was due to bacterial infection? He believed the condition was due to the toxin manufactured from or by bacteria in other parts of the body. If it were a bacterial condition, surely the obvious thickened masses of fibrous tissue should yield the causal organism. He knew of only one case in which that was claimed to have been done—namely, in a case of gonococcal rheumatism in which Ware extracted the gonococcus from the muscles surrounding the shoulder-joint. Mr. Kenneth Goadby gave a very interesting paper before the Section of Balneology a short time ago, but all he said in this connexion was that fibrositis might be microbial in its origin. Goadby said he could not, from the thickened fibrous tissue, obtain the organism, but in some cases of fibrositis in which he used massage and the Bier method he obtained from the urine an organism which had not been there before the massage and the Bier treatment. Goadby's contention, therefore, was that the Bier method and the massage had squeezed the organism out of the thickened fibrous tissue and that it then found its way into the lymph- and blood-streams, and so into the urine. Mr. Goadby made cultures of the organism and injected it into rabbits, and so reproduced the arthritis and the fibrositis, but again he failed to find the organisms in the fibrous tissue. The same remarks he thought applied to gout. Gout he considered to be due to a toxin, which was probably elaborated in the intestinal tract and absorbed therefrom. Except for advertisers of quack remedies uric acid had ceased to be regarded as a toxic agent or a causative factor in gout.

Dr. J. C. McWalter said he considered the number of cases upon which the results now set forth were based were inadequate for the formation of a definite conclusion. He thought the treatment of gout, and even the treatment of rheumatism, was a reproach to the medical profession. There was evidence that the attempts to cure those conditions dated back to ancient Rome, for the conditions which prevailed then were much like those met with now. There was some advance when it was said that the variety of complaints affecting the joints were due to uric acid. But now a high authority came forward and said that uric acid was a harmless by-product in the system, and that the profession was labouring under a misapprehension in supposing that excess of uric acid meant anything. At one time excess of lactic acid in the blood was invoked as a cause. The latest evidence was that the joint conditions were due to a mixed infection. His difficulty was that there was nothing to show that the patient would not have got well if no treatment had been carried out. Some people had rheumatism or gout every year, others every two years. Dr. Luff said that all these conditions were toxaemias, but did that help one very much? What was the practical outcome of one man saying the disease was microbial and another stating that it was a fibrositis due to toxaemia as a result of microbes elsewhere? Because certain microbes were found it did not follow that they were the cause of the disease; they might be only concomitants, hence it was not right to inoculate the unfortunate patient with 250 millions of these microbes on the off-chance of staving off an attack.

Dr. T. D. Lister asked what dietetic treatment was adopted in addition to the vaccines. Was there likely to be any association between the toxins and the various ingesta?

Dr. LYON SMITH, in reply, reminded members that he admitted that Dr. Luff had, in his recent Harveian Lecture on Fibrositis,[1] largely covered the ground of the present paper, which was written several months before that lecture was delivered. Dr. Luff's contribution, however, made no reference to the treatment of these toxæmias other than by drugs, electrical and general treatment. If it was agreed that the cause of a condition was toxæmia it did not matter whether the microbe elaborating that toxin was in the fibrous tissue or in the stomach. He could speak on the subject from personal experience. For the last ten years he had suffered severely from gout, and he had been reluctant to modify his diet, as it meant giving up what he liked most to eat and drink. If one consulted a gout specialist he found out what forms of food, wine, &c., one most appreciated, and promptly drew up a diet table from which they were excluded. Consequently the general condition was lowered and less able to resist any invasions which might happen to one. He thought some cases of early cancer occurred in people who had been severely dieted for gout. It was surely better to have a generous diet and risk some gout than succumb to more deadly diseases? Four years ago, when he began to work with Sir Almroth Wright, the first vaccine he made was one for himself in an effort to cure his post-nasal catarrh. This was a pneumococcal vaccine and the first few injections made him feel ill, but after a few months he found he was able to take a diet which included beer and stout with impunity, and he connected that impunity with the immunity he obtained from the doses of vaccine. Dr. McWalter said it was rash to inject 250 million streptococci into a patient; but no sane person would do that. One would commence with 25 million or even less, and the 250 million represented the stage one hoped to reach in a successful case: the degree of immunity at which laboratory workers aimed was only attainable by larger dosages. The dietetic rules in his cases were that the patient was to eat what he liked and drink what he liked, and what he found from experience suited him best. The only stipulation was that the diet should be highly nutritious. One lady asked him what he called particularly nutritious things, and he replied, red meats, yolks of eggs, caviare, oysters, Burgundy, stout, and port—not the port labelled "wine from the wood," because that was usually a port which had gone bad from secondary fermentation, and probably contained many of the gout-irritating bodies which it was one's object to avoid. This lady had been treated for a year by one of the ablest physicians in London, and the things he (the speaker) had told her to take were just the ones that physician said she must avoid. She was asked how long that treatment had gone on, and she replied, "A year." He thereupon asked her whether she felt better, and she replied, "No, rather worse." He prevailed upon her to try the richer diet table for a month, at the end of which time she was distinctly better, but whether the improvement was due to the inoculation or to the altered feeding it would be difficult to say.

---

[1] *Brit. Med. Journ.*, 1913, i, pp. 756-60.

Treatment of Ambulant Cases of Pulmonary Phthisis by T.R. and B.E. in the Out-patient Room.

By T. D. Lister, M.D.

Unfavourable Conditions of Out-patient Treatment.

There are several disadvantages which attend upon the attempt to carry out tuberculin treatment in a small out-patient department in a special hospital. This arises partly from the difficulties of the patient, partly from those due to intermittent observation. It is only when one is sufficiently fortunate to possess clinical assistants of experience that it is possible to carry on this work at all in conjunction with the other calls made on one's time at a weekly visit. I am greatly indebted to Dr. Archibald and Dr. Mackenzie for their prolonged and careful help.

After a few years' experience of administration of tuberculin in the wards I ventured to start giving it to out-patients. The first difficulty is that of deciding what observations it is possible to make. I do not see, apart from the temperature chart and the general condition of the patient in relation to his physical signs, that it is possible to make truly scientific observations, unless one devoted a special department to the subject and had a large number of highly qualified helpers.

It is not every out-patient who has the intelligence to take his temperature accurately, and the directions given must necessarily be as simple as possible. My instruction is for them to take their temperature when they wake up in the morning, which is an average time of 7 o'clock, before they have anything to eat or drink, and in the afternoon, one hour after their tea.

The temperature is taken in the mouth. The thermometer is supplied for a few pence from the hospital dispensary, the charts are distributed in the consulting room. The charts last six weeks, and are replaced when completed, the old ones being retained by myself. I am occasionally fortunate enough to get the patient's temperature verified by a medical man or district nurse. When this is impossible one can only judge by internal evidence as to the accuracy with which the patient is making his record. If doubt arises no treatment is, of course, begun until the patient can get further instruction or assistance. The charts are kept for some weeks before I feel justified in beginning the administration of tuberculin. In a course of treatment which must take months or even years there is little need to be in a hurry to begin. In patients who are at work, this delay, sometimes for six or more weeks, enables one to observe irregularity of temperature arising from so-called auto-inoculation, and the frequency with which this occurs.

The weekly interval does not afford the most scientific method of administering tuberculin. In the wards, where patients are under continual observation, doses can be spaced with a better regard to negative and positive phases in so far as these may be inferred from the temperature chart. Difficulties also arise from irregular attendance under certain conditions of employment, from temporary migration, and from varying ability to secure adequate nutrition in the same patient. Therefore, when reactions occur one has not the same control over the patient as one has in the wards of a hospital or sanatorium. I endeavour to avoid reactions.

Some patients, however, take a very intelligent interest in their treatment and obey instructions as to rest immediately any rise of temperature occurs.

For these and possibly other reasons the out-patient treatment of pulmonary phthisis by tuberculin can only be carried out with any justice to the patient and oneself in a limited number of cases; but I consider that for this limited number of cases it is useful, justifiable, and expedient.

SELECTION OF CASES.

In the selection of cases for tuberculin treatment by the somewhat clumsy methods possible in an out-patient department, there is even a greater need for care than in making the selection for the sanatorium. The phrase "careful selection of cases" seems to be a necessary disfigurement in all clinical studies of phthisis: it is purely at the discretion of the individual writer to decide all he means by it. As far as I can arrive at the consensus of opinion, it means the selection of those patients in whom a considerable amount of immunizing ability can be inferred. As immunizing ability depends on the active condition of the blood and tissue cells it follows that nutrition is an essential point. One endeavours to ascertain that the patients are in a condition to obtain an adequate supply of food, however simple.

I am convinced that the unfavourable results, which I have experienced in certain cases, were due to the failure of nutrition. I am equally confident that the favourable results that I have experienced in many cases were due to the fact that the patients were able to secure proper food. I am not at all convinced in regard to some of these latter cases that with the help and guidance of simple instruction in the hygienic treatment of phthisis, on such cards as we distribute in the out-patient room, they would not have got well without tuberculin. I can recall one afternoon when I demonstrated to three or four medical visitors three cases of tuberculin treatment which had lasted for a few months, in which great improvement had occurred. I was able to show also on the same occasion several equally good results without tuberculin.

In addition to the merely economic factor of the patient's ability to secure proper food, one also takes into account his general physique. The question of the kind of physical signs found in an infective disease producing gradual destructive changes is of less importance, to my mind, than the question of the manner in which the organism sustains the infection. A limited severe lesion, and chronic fibrosis, even with a cavity, is to be preferred to a diffuse infiltration and subacute symptoms. The very earliest case, to repeat one of the platitudes of phthisis, may go rapidly down-hill from the beginning, however sincerely we may congratulate ourselves on its early recognition. Again, the very earliest case may rapidly recover by any method of treatment that we may adopt, or there would not be such a remarkable similarity in the statistics of successful results under different methods of treatment.

The modern delicacy of diagnosis in a disease which, according to pathological evidence and bacteriological tests, is practically universal, must result in the detection of a great number of cases which simply get well. In fact, it is not too much to say that the feature of the modern literature on tuberculosis is the establishment of the theory that nine-tenths of our population recover from infection by tubercle. The relation of general infection and of the possible immunization of the population to the gradual reduction in the phthisis death-rate forms a matter which must receive further consideration than it has yet done. It is sufficient for me to recall here, with regard to the selection of cases for tuberculin treatment, that the evidence of pathology and clinical medicine seems to show that any stage of phthisis, so far as physical signs need be considered, is capable of arrest.

The important factor in estimating the ability of the patient to benefit by tuberculin treatment is the answer to the question that one must ask oneself before one begins, "How does he stand the disease while untreated?" In our busy endeavours to do something for these patients we are prone, as the result of the absorbing interest of our methods, to lose sight of the natural history of the disease.

In forming an estimate as to the suitability of a case for tuberculin treatment one must decide as to each one on its merits, and the digression that I have made in regard to physical signs is only to point out that even a case with old physical signs of fibrosis, including cavitation, may be quite suitable, especially if the new relapsed area is of limited extent and the constitutional symptoms are favourable. The temperature chart should be either slightly irregular or normal, with a limited daily range, and if with this one meets economic conditions wherein nutrition is shown to be fairly maintained, or capable of improvement, and there are no adverse factors such as we are accustomed to observe as being of some prognostic significance, one may safely begin. The adverse factors to which I like to pay some attention are those of poor physique, extreme poverty, bad family history, rapid pulse, and severe anaemia. The colour of the palate is a sign to which I attach a certain amount of significance. I have for some years been pointing out in the wards and in my out-patient rooms a sort of primrose tint in the soft palate, in conjunction with the general anaemia of the buccal mucous membrane, in cases which, on the whole, do not do well. It is perhaps the tint due to a very severe anaemia. The prolonged absence of menstruation is also a serious element of doubt, although in one or two cases at the Waterloo Hospital I have seen menstruation return under tuberculin treatment.

I wish to make it clear that in the wards or in a sanatorium, where one has a greater control over all the daily life of the patient, tuberculin treatment can be carried out in a very much larger number of cases than in the out-patient room.

COMMENCEMENT OF TUBERCULIN TREATMENT AND DOSAGE.

After some weeks of observation, except in cases returned to the out-patient room from the wards, treatment is commenced. During the interval from the commencement of the chart, the patient is questioned as to the accuracy and care with which his chart is kept, his weight is watched, his sputum is examined, and the ordinary medical treatment is adopted. The latter often includes simple medicines, such as rhubarb and soda, malt extract, lime salts, cod-liver oil, and small does of creosote in keratin-coated pills.

The dose of tuberculin with which I usually begin treatment is 0·00001 to 0·00002 mg. of T.R. The first dose is, of course, rather experimental, and the patients whose treatment is commenced in the out-patient room are specially warned as to the necessity of careful registration of their temperature during the first two or three days after the dose. They are also asked to tell me anything special they may notice about themselves after the injection. I endeavour to do this as far as possible without giving them a lead as to the answer I expect. They are, however, told to rest in bed should their temperature go up, or should they feel ill after an injection, for at any rate the first twenty-four or thirty-six hours after the temperature rises or the feeling of illness comes on. As my out-patient attendance at the chest hospital is on Friday afternoon, and any feeling of a general reaction is not very likely to begin until the middle of Saturday, the injection being made usually from 3 to 4.30 o'clock on Friday afternoon, it is not difficult, even for working patients, to rest during a slight rise of temperature. As a rule, with the small dose here indicated there are no initial reactions, nor does the patient notice any subjective symptoms which might be regarded as reactions.

COURSE OF TREATMENT.

At the next visit, if there is no reaction, either as shown by a slight rise of temperature or by any symptoms which could legitimately be described as evidence of undue susceptibility, the dose is immediately increased. The second dose usually given is 0·00003 mg. All being well, at the next visit the dose will be again increased to 0·00004 or 0·00005, and in succeeding weeks the dose would go up to 0·00007 and then 0·0001. As time goes on the dose gradually increases so that an ordinary course of treatment can be represented by the following table:—

1st	week	0·00001	mg. T.R.	13th	week	0·003	mg. T.R.
2nd	,,	0·00002	,,	14th	,,	0·005	,,
3rd	,,	0·00003	,,	15th	,,	0·007	,,
4th	,,	0·00005	,,	16th	,,	0·01	,,
5th	,,	0·00007	,,	17th	,,	0·02	,,
6th	,,	0·0001	,,	18th	,,	0·03	,,
7th	,,	0·0002	,,	19th	,,	0·05	,,
8th	,,	0·0003	,,	20th	,,	0·07	,,
9th	,,	0·0005	,,	21st	,,	0·1	,,
10th	,,	0·0007	,,	22nd	,,	0·2	,,
11th	,,	0·001	,,	23rd	,,	0·3	,,
12th	,,	0·002	,,	24th	,,	0·5	,,

This course could be appreciably shortened by a bi-weekly visit, in cases running a normal chart.

These figures are, of course, merely an indication of what would take place in a case progressing without any unfavourable symptoms and without any reactions. It is unfortunately the case, to my knowledge, and it must be the experience of many other physicians seeing phthisis cases in consultation, that a great deal of unsatisfactory and even dangerous tuberculin administration is being carried on at the present time. Series of doses are prepared by commercial firms, and issued to practitioners, who administer them with an inadequate regard to the toxicity of the preparations. Tuberculin is a toxin and not an antitoxin, a truism which is often ignored in practice. I have known a case receive tuberculin treatment for several months, during which time the temperature was only taken twice. I have known the same thing happen without any temperature observations being made at all after the first week, during which rapidly increasing test doses of old tuberculin had been given. I think a strong protest should be made against the present indiscriminate application of tuberculin in many forms of tuberculosis, including the pulmonary.

For reasons that I have stated, it is difficult to ascribe a successful result to our own efforts. No doubt many of these patients, to whom a commercial series of tuberculin is administered, do improve. But I feel also that harm can easily be done by the use of tuberculin by those whose opportunities have not included the observation of large numbers of cases of pulmonary phthisis, such as may be obtained in the out-patient department of a chest hospital.

Should any dose of tuberculin be followed during the next two or three days by a rise of temperature, the dose given on that occasion should not be increased at the next visit. Should the temperature, which had previously been running an even course, be still disturbed on the evening before the next visit, it is advisable to omit the dose, although this course, in the case of out-patient treatment, involves sometimes an undue prolongation of the interval. In the following week, if the temperature is now normal, the previous dose may be repeated, and if on the succeeding visit the temperature has remained normal, a progressive increasing of dosage may be resumed. Should the repetition of the previous dose, however, be again followed by a reaction, it may be necessary to diminish the dose at the next visit; but no dose should be given after a reaction until the temperature has been quite normal under the ordinary conditions of the patient's life for several days. As the cost of T.R. rapidly increases when the doses approach a milligramme, and as the successful increase of dose without reactions up to 0·001 or 0·01 mg. implies a considerable amount of tolerance on the part of the patient, I have in many cases commenced administration of B.E. at this stage. B.E. has to be considered as much more toxic than T.R., and from certain observations made in the wards of the hospital I do not think one should commence the administration of B.E. in the out-patient room with more than one-fifth of the previous dose of T.R. Supposing that we had managed to attain a dose of 0·01 mg. of T.R., I should use my discretion as to the administration at the next visit of 0·002 mg. of B.E.

Thereafter progress in the increase of dosage would follow very much the same lines as those for T.R., and the weekly table could be constructed in the following form :—

16th	week	...	0·01	mg. T.R.	24th	week	...	0·05	mg. B.E.
17th	,,	...	0·002	mg. B.E.	25th	,,	...	0·07	,,
18th	,,	...	0·003	,,	26th	,,	...	0·1	,,
19th	,,	...	0·005	,,	27th	,,	...	0·2	,,
20th	,,	...	0·007	,,	28th	,,	..	0·3	,,
21st	,,	...	0·01	,,	29th	,,	...	0·5	,,
22nd	,,	...	0·02	,,	30th	,,	...	0·7	,,
23rd	,,	...	0·03	,,	31st	,,	...	1·0	,,

Again, a bi-weekly observation might shorten the course in favourable cases.

If all goes well and doses above 0·1 mg. of T.R. are being tolerated with impunity, the interval between doses may sometimes be increased. Usually I prefer to see these patients weekly even if no dose is given. When doses of 0·1 mg. B.E. are attained, then I think that in many instances a fortnight may be allowed to elapse, and when doses of 1 or 2 mg. are reached, and the patient remains well, the interval may be further extended to four or six weeks.

CONCLUSION OF TREATMENT.

I am unable to say when treatment should be discontinued. I have not taken any out-patients beyond the dose of 2 mg. of B.E. Discontinuance of tuberculin treatment is a difficult matter upon which to decide. Both in satisfactory and in unsatisfactory cases the question is more likely than not to be taken out of our hands by the patient himself. I consider it desirable, where an apparently successful result has been obtained, that the patient should come up at intervals of one to two months, to repeat the maximum dose which has been reached in his case. In this manner he can be kept under observation and tested as to the permanence of the tolerance which has been established. In certain cases after attaining a dose considerably less than 2 mg. of B.E. one is led to the opinion that the dose attained is the maximum that could be given to that individual. Attempts at a slight increase in such cases seem to lead, if not to a temperature reaction, at any rate to subjective symptoms which give one reason to pause. In some of these cases it is possible by a very slight increase of dose, after a repetition of the preceding dose, to bring about a higher degree of tolerance. It is no doubt possible in patients in whom a high degree of tolerance has been established to carry their dosage to several multiples of a milligramme.

As I have said elsewhere, the after-care of all cases of pulmonary phthisis presents identically the same problem as that of the prevention of the disease. In this matter economic factors have the largest place. I have as yet but little faith in the permanence of any immunity resulting from an attack of revealed or open tuberculosis, by whatever method it may have been treated, although, of course, it occurs. Tuberculin treatment has the great advantage at least of keeping the patient under observation and guidance for a very long period.

TECHNIQUE AND GENERAL REMARKS.

The tuberculin used in my out-patient department is prepared by Dr. Hunt, Pathologist to the Hospital. It is sent in a series of decimal dilutions corresponding to:—

0·0001
0·001
0·01 mg. bacillary substance in each 1 c.c.
0·1
1·0

It is diluted with 0·8 per cent. salt solution containing 0·5 per cent carbolic acid. It is heated to 58° C. for half an hour. The injections are usually made in the patient's arm, which is washed with a lysol solution over the region of the outer head of the triceps or about the insertion of the deltoid. After the injection the puncture is dried and occasionally covered. The syringe is of glass and the needles and syringe are sterilized in the ordinary manner. The doses are measured by decimal divisions of a cubic centimetre in the syringe.

A printed card of general instructions as to hygiene and nutrition is given to every patient, whether under tuberculin treatment or not. Medicines are used in a limited way, chiefly in the forms I have already mentioned. The use of medicines is sometimes criticized when one adopts a method of immunization. But I cannot see why we should cease to give these patients the older remedies. If any good whatever can be ascribed to them, it seems to me illogical and purely academic to deny them.

In regard to cough, however, in ordinary cases of pulmonary phthisis I do not use derivatives of opium, and I find that liquorice and menthol pellets are usually sufficient to stop the cough when troublesome. Patients are also taught not to cough except for the purpose of expectoration. The patient rapidly acquires the power of distinguishing between the possibility and impossibility of removing sputum from his chest.

In conclusion, I would like to say that my attitude towards tuberculin treatment in cases of ambulant phthisis in the out-patient room is at present rather one of investigation than of conviction. If I may be allowed to coin a phrase, I would like to compare the power of immunization to an elastic force, and to speak of the "elasticity" of individual resistance. If I may wander into a figure of speech for a moment, I would liken the patient's resistance to an elastic cord, which may be of any strength, holding up a weight which may be compared to the disease. If we imagine such a weight suspended by an elastic cord in a condition where the cord, though moderately stretched, sustains it easily, and a tap is given to the weight, the cord is momentarily stretched and subsequently rebounds, so that for a moment again the weight has rebounded to a higher position than when at rest. If we further imagine that at the height of rebound the elastic cord is strengthened by an additional thread being added into it, then by a series of experiments we could arrive at a position where the cord would be too strong to be affected by further blows on the weight. We can imagine also that the original cord is so slight that any blow would cause it to give way. Tuberculin treatment can be applied with benefit to those patients who possess an "elasticity of resistance" comparable to that suggested by the first part of my metaphor, and only with disaster to those whose resistance is already stretched to its limits. It should be more easy to reject the latter class than to select the former for treatment by this method.

DISCUSSION.

Dr. J. C. McWalter said he did not know what moral was supposed to be drawn from the paper. As Chairman of the Dublin Insurance Committee, he had had much to do with the treatment of persons in the City who had tuberculosis, at the expense of the rates; but he could not satisfy himself that they had done any good, except that the patients had change of air and good food. Some had been treated with tuberculin, but many without: and it did not seem to make much difference; but if there was lack of care with tuberculin, patients died more quickly. In a general way, the treatment by means of tuberculin was one of the most hopeless things he knew of. The profession had been misled by statistics which seemed to suggest that the mortality from the disease had been lessened as the result of treatment. There was no proof that the percentage of persons who recovered after attack was greater now than formerly, even than 200 years ago. Of course, the general death-rate was now much lower than formerly; and as the number of persons who died from tuberculosis was probably one-sixth of the whole, naturally there were not so many cases of death from phthisis. The cases had simply shared in the general diminution of death-rate which was assumed to be due to improved conditions of living. But what required to be proved was that any special therapeutic measure had notably diminished the number of cases of death from the disease. He did not know of any figures proving that. Dr. Lister might retort that a few years ago the deaths from tuberculosis were 5·3 per 1,000 living, whereas they were now less than 2; but he (the speaker), suggested that those figures were fallacious: they were based upon the system of registration, which he regarded as the loosest thing on earth. Where consequences followed, one had to be careful about attributing a death to phthisis. If one was called upon to certify the death of a person who had been insured six months, although there might be good reason for thinking he died from tuberculosis, it would not do to put it down as such on the death certificate unless there was certainty, because it might mean that the relatives of the insured person would lose their insurance money. In some cases there had been improvement from what was known as sanatorium treatment: but practically every disease improved when the conditions of living were better—good food, freedom from anxiety, good clothing, and plenty of fresh air. There were no strictly medicinal measures by which one could claim to kill the tubercle bacillus; and he feared the history of tuberculin would be like that of so many other remedies, and that it would be found to have been of less use than many of the old-time remedies for the disease, such as cod-liver oil, creosote, &c.

Dr. W. J. Fenton said he had treated all his cases of phthisis with tuberculin, because he thought it difficult to draw conclusions if only a selection of cases were so treated. If one selected for the treatment cases which were likely to get well under any circumstances, the value of the treatment must be thereby discounted. He had included in that treatment febrile cases. He thought vision was somewhat obscured by the use of terms which they were not prepared exactly to define, for instance, "auto-intoxication." There were cases which one put to bed for several weeks because of the persistence of the temperature, yet it did not come down; and at the end of that time the patient was told to get up. On doing so, the temperature had come down. He noted that particularly in one very severe case which had been treated with absolute rest, and yet the temperature had a wide range of oscillation. The patient was therefore allowed to sit up from time to time, and that marked the commencement of the temperature drop, and that patient did very well. The result of his treatment of a series of unselected cases with tuberculin was that they seemed to improve, but he still remained in doubt as to the real value of that measure. In the case of out-patients, so much depended on their home circumstances, on their intelligence, on the kind and quantity of their food, &c. He thought it probable that, on the whole, tuberculin did good. But one could not give more than a general impression; as Dr. Lister said, there was no time thoroughly to investigate and follow up each case. Patients liked to have the injections, they felt something was being done for them, but how far the mental effect influenced the view he did not know.

Dr. BATTY SHAW agreed with Dr. McWalter that despite the numerous papers dealing with the use of tuberculin to cure human tuberculosis he was not convinced that it had any beneficial effect whatever. The same difficulties which beset the use of tuberculin in the cure of cattle applied to man—and one of these difficulties was the spontaneous cures which occurred both in animals and in man. One of the best antidotes for the prevalent enthusiasm for the use of tuberculin in man that he could remember was a perusal of the papers emanating from Germany, France, and South America, in which it was clearly shown that veterinary surgeons could not satisfy one another that even the preventive use of tuberculin was established. The positive tuberculin reaction in cattle was not met by the use of tuberculin to cure them; they were slaughtered.

Dr. LISTER, in reply, said the general trend of the remarks on his paper had been largely in accord with his own views; the question was still *sub judice*. The moral of his paper—if it had one—was that it was one's first duty not to hurt the patient. He had tried to make it clear that one of his objects was to ask for a protest against the indiscriminate use of tuberculin which was being carried on. Some cases, even with large cavities, healed up and did well when the patient was under the influence of tuberculin and while still attending the out-patient department, but he had said in the paper that he did not often know that it was due to the tuberculin. The charts he showed were in illustration of the remarks he had made. The case which did best was that of a man who had recovered before, but relapsed eighteen months later; he had a fibroid upper lobe, and active disease in the upper part of the left lower lobe. When put on tuberculin he rapidly gained in weight and the disease again became arrested. He had not much faith in a permanent immunity resulting from any method of treating phthisis. And he was doubtful about the new theory of population immunity which had been quoted by statistical writers in this country, and by a medical writer at the Rome Congress. He was not disposed to consider a man a better life *qua* tubercle because he had had tubercle; but prognosis in regard to this disease was full of doubt and error. A medical man, with cavitation in both upper lobes, came into his (Dr. Lister's) consulting room with the view of purchasing an annuity with the few hundred pounds left out of his ruined career. He had crepitations all over both lungs, a temperature of 103° F., a pulse of 130, myotatic irritability over both sides of the chest, front and back, and so on. His report was, that if the insurance company took any of that man's capital they would be robbing him, because he had such extensive disease and was so ill. That was six years ago. He had heard of a letter from the said doctor a few months ago, saying he had been out shooting springbok. He had spent practically one year in bed at a farmhouse, and now, though his lungs were wrecked, the disease had apparently been arrested.

Medical Section.

May 27, 1913.

Dr. FREDERICK TAYLOR, President of the Section, in the Chair.

Cases of Chyliform Effusion.

By H. A. LEDIARD, M.D.

(I) CHYLIFORM ASCITES (TUBERCULAR), WITH NOTES OF AUTOPSY BY PROFESSOR BEATTIE.

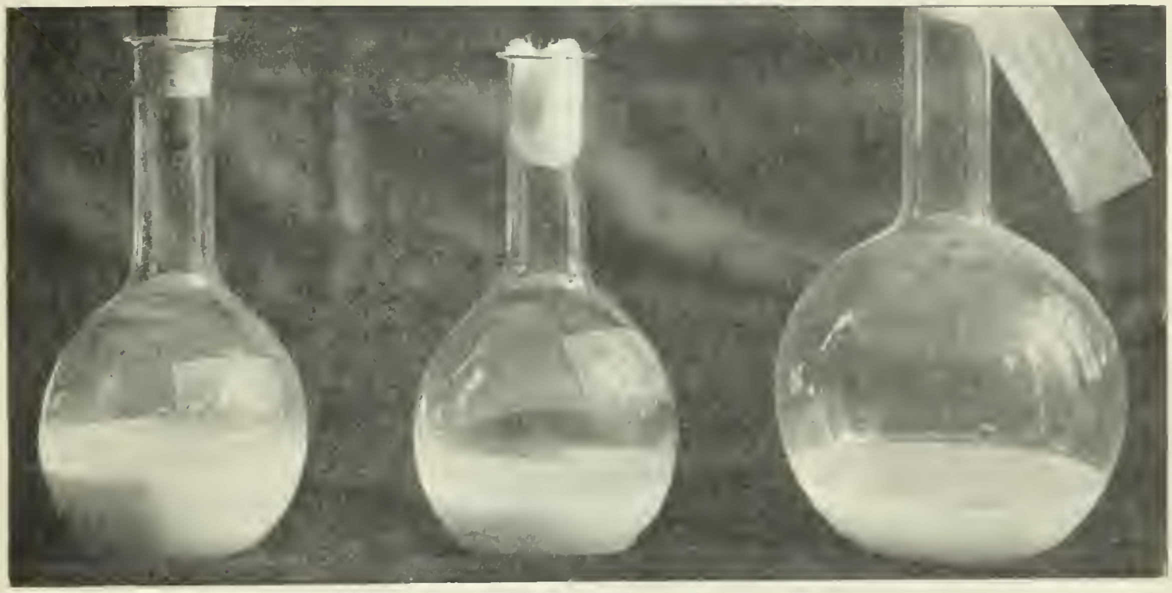
IN 1903 an example of chyliform ascites came under my observation, and so uncommon are such cases that I have ventured to bring before this Section a short account of it, and I do so with greater confidence because a carefully made autopsy by Professor Beattie is added, and the case, if wanting in some clinical details, is at any rate complete from a pathological point of view.

On July 1 acquaintance was first made with the patient, and he died on July 28, and the only clinical observations at hand are those made between these dates. The patient, a lad, aged 18, belonged to healthy parents and was the only delicate child of a family of eight. There was no tubercular taint, except that a maternal aunt died from tuberculosis at the age of 47. When aged 5½ an attack of abdominal pain first came on, resembling peritonitis, followed a month later by a second attack with similar symptoms, and recovery was associated with emaciation. In 1892, or when aged 7, there was a slight threatening of the old abdominal pain. For the next eight years the boy went to school, but a kind of delicacy of health was evident, and he became a student rather than one enjoying games. In the early part of 1903 the patient went abroad, and all doctors who examined him agreed that he suffered from tubercular disease within the abdomen.

At the date of my first visit the patient was not confined to bed and appeared to have some enjoyment of life, but his aspect pointed to a grave condition. The swollen abdomen contrasted markedly with a thin, pale face, and limbs destitute of fat and poor in muscle. The face was expressive of prolonged physical depression rather than of pain, the disposition was quiet, the habits studious, and the appetite capricious. The costal margin was much displaced by prolonged pressure from below, the abdomen was moderately tense, and had a fluctuant wave all over. The anterior abdominal wall showed distended veins, and when he coughed fluid passed down the left inguinal canal into the scrotum. The enlargement of the abdomen had been remarked upon in 1897—i.e., six years before I saw him. Dullness on percussion was found for a limited area above the umbilicus, elsewhere bowel seemed to float above the fluid. The temperature, July 1, 4 p.m., was 101·6° F. There was no vomiting or cough, but diarrhœa was a prominent symptom. The urine was free from albumin and sugar, bile pigment was present in small amount, but no jaundice of the skin was noted. From the history and from the physical examination a diagnosis of tubercular peritonitis was arrived at and drainage of the abdomen recommended. Four days later visible pulsation of the heart was seen in the second and third interspaces, the liver was displaced upwards, and the patient complained of the tightness of his clothes. On account of the rapid respiration and cardiac displacement an incision was made above the umbilicus, with the result of striking a milk-white fluid at once. Six pints were removed and a drainage-tube inserted, but the abdomen was not explored. After the tapping fluid was not felt again in the scrotum. I mention this as it proves that the fluid was free in the peritoneal cavity. A sample was referred to the Clinical Research Association, and the report received was as follows: "This is a milky fluid of alkaline reaction and a specific gravity of 1005. It contains six parts per thousand of albumin and less than 0·2 per cent. of fat. On microscopic examination it is seen to contain an emulsion of fat and numerous bacteria, with certain extraneous matters, but no distinctive cellular elements can be found, and both pus and blood are absent. Owing to the decomposed state of the specimen its microscopic examination was somewhat unsatisfactory. In its characters the specimen does not differ from a transudation fluid poor in albumin and of low specific gravity. Fluids of this character when ascitic are very frequently chylous or rather chyloid."

Summary of Case after Operation.

The incision was made on July 7, and death occurred on July 28. At first there was a free discharge of milky fluid, but the tube was removed on the fifth day after the puncture. The temperature varied, being seldom normal or subnormal and usually between 99° and 102° F.; during the last few days there was a gradual fall to 97° F. The tongue, at first coated with a thick white fur, cleaned after the operation; then became dry as the general condition changed for the worse. The pulse-rate was from 90 to 120, but no irregularity was ever noted.



July 7, 1903.
Chyliform ascites; tapping.

July 9, 1903.
Fluid run through tube.

July 29, 1903.
Fluid in abdomen at post-mortem.

FIG. 1.

Perspiration showed sometimes about the head, then heat and dryness were seen. Towards the end large areas of capillary stasis appeared over the chest and abdomen, not disappearing on pressure; the face was occasionally cyanosed. The respiration varied from 24 to 38, and finally became irregular, and crepitations were heard over the front of the chest. After operation the appetite improved and some solid food was taken without sickness; vomiting was seldom noted. Towards the end strabismus and diplopia were noted, but the pupils remained equal. Speech became indistinct and confused; there was drowsiness and muttering during sleep. The hands became restless and tremulous, some periods of excitement were passed, and the legs became sensitive to touch. The abdomen tended to increase in size, chiefly from flatus, and there may have been some reaccumulation of fluid. The kidneys continued to act sufficiently; sometimes micturition was difficult and sometimes there was involuntary urination. Emaciation during the last week of life was very noticeable. There was slight right facial paralysis. Memory became defective. There were optical delusions, and the hands searched the air.

From the squinting, facial paralysis, drowsiness and mental symptoms, it was concluded that tubercular meningitis was present, but there were no convulsions or coma at the termination.

Duration of the Disease.

Judging from the appearance of the costal margin the disease had been going on for many years, perhaps even twelve, and dated probably from the attack of severe pain in the abdomen which resembled peritonitis. In further proof of the chronicity of the disease it may be mentioned that when at school the boy had a delicacy of stripping before others on account of the protuberance of the abdomen. It is further suggested, as probable, that the severe attacks of abdominal pain in 1890 and 1891, during which the legs were drawn up and cries of agony were heard, were associated with distension of the lymphatic vessels behind the obstruction, with transudation of chyle within the peritoneum.

Although it cannot be said that the pain associated with transudation of chyle within the abdomen differs from pain due to other causes, yet it is somewhat suggestive in my two cases. In the tubercular case there were attacks of acute abdominal pain, the cause of which was unrecognized. In the second case, assumed to be due to pressure of glands in the neck, the sudden onset of acute pain created a suspicion of peritonitis.

In Dr. Cayley's case[1] there were symptoms pointing to acute peritonitis, ending in rapid death, in the same way that my case came to a sudden and unexpected collapse.

Report of Autopsy (by Professor J. M. BEATTIE).

The body was emaciated; the abdomen was very much distended. On opening the abdomen a chylous fluid escaped. This fluid was found to be free in the abdomen, but more on the right side than the left. It

---

[1] "Obstructed Thoracic Duct," *Trans. Path. Soc.*, xvii, 1866.

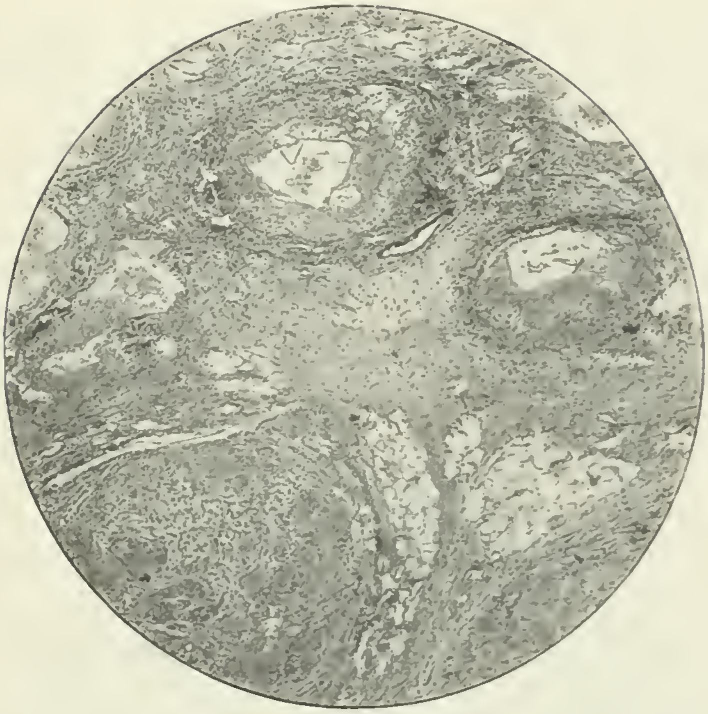


FIG. 2.

Section of lymphatic gland showing lymphatic channels with cellular thickening (tubercular) of their walls, causing marked obliteration of their lumen. There is also extensive inflammatory change in the surrounding tissues. At the lower part there is a large tubercular area. (× 26.)

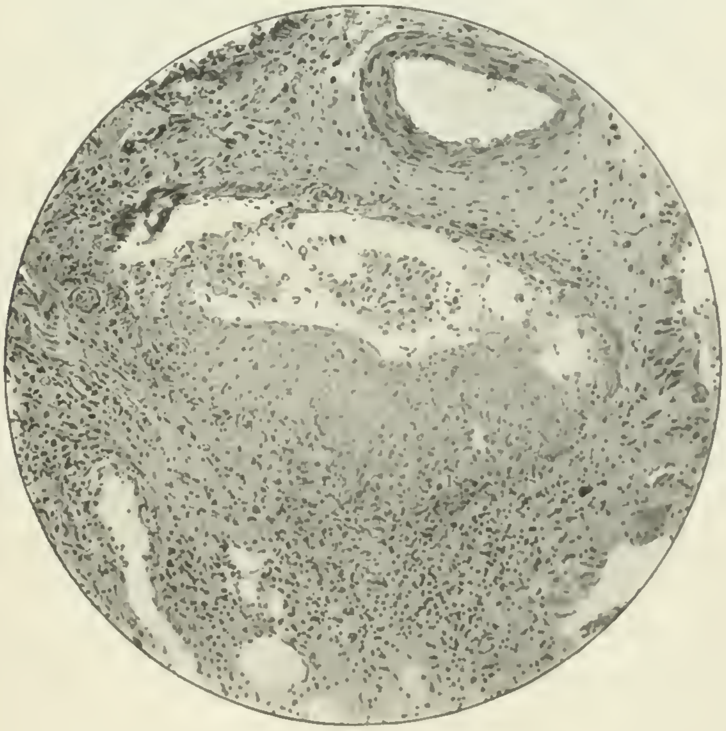


FIG. 3.

Section of lymphatic gland showing lymphatic channel with cellular thickening at one side, numerous mononuclear cells in lumen, lymphocytic infiltration in surrounding tissues. (× 100.)

was, however, not shut up in loculi. Seventy-five ounces were removed. The intestinal coils and the stomach were very markedly distended by flatus. So great was this distension that the heart was pushed upwards. The peritoneum was thickened throughout and was studded with minute, firm tubercular granulations. There were no adhesions between the intestinal coils themselves, or between them and the abdominal wall. The omentum showed very numerous but extremely minute tubercular granulations. It was not thickened and was not adherent, except to abdominal wall at the site of incision (operation). The mesentery was very much thickened and the mesenteric glands greatly enlarged, many of them measuring fully 2 in. in diameter. These glands were pale, very firm, and on section showed no trace of caseation. The superior mesenteric vein and its branches were very much distended and the wall thickened. The main trunk was fully ¼ in. in diameter near its origin. In the region of the pancreas for fully 1½ in. there was a mass of glands and fibrous tissue in the middle line. The fibrous mass was constricting the superior mesenteric vein and the splenic at their origin, so that the lumen at this point would admit only a very fine probe. The splenic vein to the left of the constriction was much distended and passed through a continuation of the fibrous mass to the left. The receptaculum chyli could not be seen, and was apparently obliterated by this fibrous mass. *The thoracic duct in the thorax showed no abnormality*, but the lymphatic vessels in the mesentery were very considerably distended and their wall very greatly thickened. No ulceration or rupture could be made out.

Microscopical Examination of Sections of Mesentery.—The main thickening was due to glandular enlargement and distension of veins and lymphatics. The glands showed numerous tuberculous foci. In most of these there was early caseation in the centre, with cellular proliferation round these areas and well-formed giant cells. In some there was distinct fibrous formation round the nodules. The veins were greatly distended and their walls thickened. The efferent lymphatics showed a very marked distension, and the walls, especially the muscular fibres, showed considerable thickening. These lymphatic channels were very irregular and contained numerous mononucleated cells, the nuclei being rounded and staining darkly. At places these cells were accumulated at the periphery of the channel and appeared to be derived, at any rate in part, from proliferated cells lining the spaces. In some of these dense masses of cells there was a considerable amount of fibrin, in which the cells were entangled. At other places there was distinct evidence of organization, young capillaries and young connective tissue cells invading these masses of cells from the periphery of the vessel.

Intestines.—There was no evidence of ulceration, and no waxy degeneration.

Liver.—Both under the capsule and in the substances there were very numerous *small tubercular granulations.* Microscopically these are seen to be very early nodules, consisting of proliferated cells, without caseation and without giant cell formation. The bacillus of tuberculosis could be shown in small numbers.

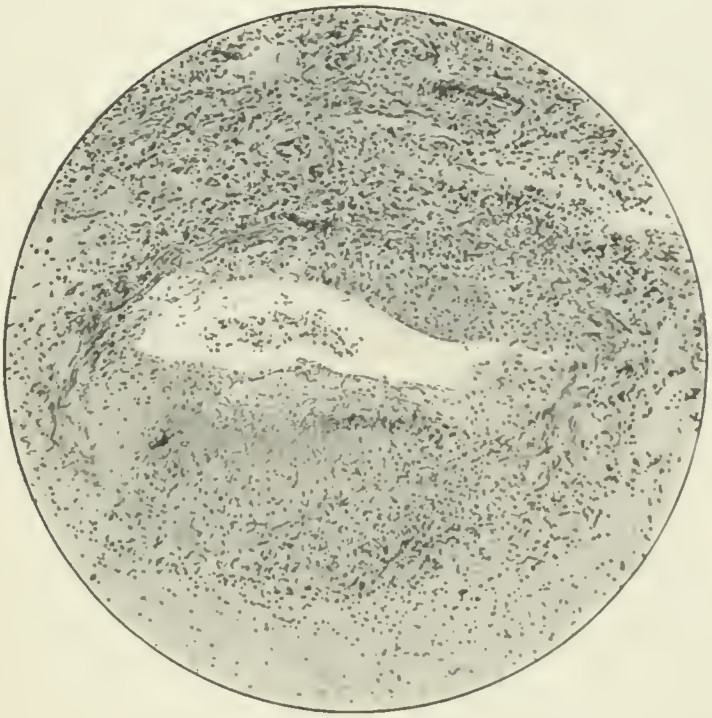


FIG. 4.

Section of lymphatic gland, showing lymphatic channel with thickened tubercular wall at parts becoming caseous; lymphatic infiltration of surrounding tissues. (× 75.)

Spleen.—The spleen was considerably enlarged, measuring 8 in. long, 8 in. broad at its upper end, and 4 in. broad at its lower end, and 2 in. in thickness. It was bent on itself from without inwards in its transverse axis. It was firmly bound down to abdominal wall by old adhesions—these adhesions being the only ones present in the abdomen. On section it was dark in colour and the pulp fairly firm. No tubercular granulations could be made out with the naked eye. *Microscopically* there are a *few tubercular granulations*, some of them showing mere cellular proliferation, others showing a slight amount of caseation, and here and there is a well-formed giant cell.

Kidneys.—These showed fairly numerous small *tubercular granulations scattered through the substance. Microscopically* there is very little abnormal, except the presence of *early tubercular granulations.*

Lungs.—Both showed a very extensive miliary tuberculosis. No evidence of cavity formation. *Microscopically* the tubercle nodules are seen to be very recent—the majority being in the cellular stage without caseation. No giant cells were seen. At the periphery of the nodules the vessels are dilated and at parts there is distinct hæmorrhage, the air vesicles being filled with blood. Tubercle bacilli are present but not numerous. The glands at the roots of the lungs were enlarged, and resembled those of the abdomen. There was no enlargement of mediastinal glands.

Brain.—There was considerable flattening of the convolutions, uniformly on the two sides. At the base there was a turbid, gelatinous exudation in the interpeduncular space, spreading forwards over the optic chiasma and laterally along the Sylvian fissure, and posteriorly to surface of the cerebellum. In the membranes over these regions there were very numerous tubercular granulations.

Summary of Autopsy.

Tubercular disease was widely distributed throughout the body. The peritoneum, omentum, mesenteric glands, liver, spleen, kidneys, lungs and brain all showed, either with the naked eye or with the microscope, a deposit of tubercle. As regards the lymphatic system in the abdomen, the receptaculum was apparently obliterated in a mass of glands and fibrous tissue, and the different lymphatics showed a very marked distension. Obliteration of the receptaculum and evidence of dilatation of the lymph vessels behind the obstruction are the main features in the pathology, the morbid material is tubercle, and the method of chyliform ascites was by transudation. No perforation was found, and had a perforation or rupture existed there would have probably been no distension of lymph vessels.

Remarks.

This case is in some respects fairly complete, and can be read with those of a similar nature, recorded by others. That the origin was a tubercular disease affecting the mesenteric glands can hardly be doubted, and as it progressed the receptaculum chyli was subjected to pressure, and that chyle transuded for years seems the probable truth. Death was due to tubercular infection of the membranes of the brain, after a long period during which the disease was limited to the abdomen. All who saw the case during the last months of life, amongst whom were Dr. Lewis Smith and Professor Greenfield, were agreed upon the presence of tubercular disease within the abdomen, but the chyliform ascites met with at the tapping was wholly unexpected, and, in the absence of any recognized symptoms pointing to such an effusion, future operators upon such cases will probably meet with a similar surprise; for there is no diagnostic sign to indicate a chyliform ascites, short of tapping or exploratory incision. That the thoracic cage at its inferior margin indicated prolonged pressure from fluid in the abdomen is what would be met with in any case in a young subject, whether due to cirrhosis of the liver or ordinary ascites due to any other cause, but in my case the shape of the abdomen seemed to show that the fluid in the abdomen was collected more in the upper half, and thus it was that the incision made came above the umbilicus. Such a peculiarity might be of service in another case of a like kind. The fluid showing itself in greatest bulk beneath the costal arch might suggest that a cyst was present, but it will be remembered that the fluid was free in the abdominal cavity, as proved by its easy descent down the left inguinal canal during coughing.

The case of chyliform ascites, published by Whitla in 1885, may be contrasted with my own in 1903. Whitla's patient was a boy, aged 13, my case was a lad, aged 18. In both tubercular infection was the cause of the effusion, but with this important distinction: In Whitla's case a perforation of receptaculum chyli was found, which had permitted pure chyle to escape for months. The analysis of the fluid showed that it consisted of almost pure chyle, and from December 7 to February 14, or sixty-eight days, 15 gallons were drawn off, or 31 oz. per day, and yet the patient did not lose weight. In my case the fluid met with was not pure chyle, but a transudation through the walls of the lacteals, and the chemical analysis of the two effusions is very different.

(II) CHYLIFORM ASCITES ASSOCIATED WITH HODGKIN'S DISEASE.

The second example of chyliform ascites from transudation of chyle was due, I believe, to pressure on the thoracic duct at its termination, but there was no autopsy permitted, in order to verify this. The case was one of lymphadenoma, or Hodgkin's disease, occurring in a girl, aged 18, who had not long before undergone two operations—first operation, May, second operation, June, 1912—for removal of masses of glands on the left side of the neck and in the left axilla. On re-admission to hospital, December, 1912, there were symptoms of peritonitis and fluid within the abdomen, and when tapping was done a milky fluid was withdrawn. The girl had become emaciated and colourless, and looked starved, in spite of rest in bed and careful attention to feeding. I have some of the glands here and suggest, although it cannot be proved, that pressure on the duct at its termination caused a transudation of chyle within the abdomen, because there were, at the time, many more glandular enlargements at the root of the neck on the left side, as well as on the right. Whether there was any effusion of chyle within the thorax cannot be even surmised.

Among the sixty-eight cases of chyliform ascites tabulated by Dr. Batty Shaw there are eighteen due to compression of the thoracic duct, or lymph vessels by glands or neoplasms, and I believe that this case of Hodgkin's disease, in which there was a transudation of chyle, may be safely added to the number.

I have the fluid herewith, which may be compared to the fluid from the tubercular case. The following is the laboratory report:—

Report of Clinical Research Association on Fluid from Abdomen, dated December 28, 1912.—This fluid is faintly alkaline to litmus, has a specific gravity of 1011, and its albumin content 1·2 per cent. (Aufrecht). The centrifugalized deposit is moderate in amount, and consists almost entirely of pus cells, together with a very finely emulsified fat. Films stained according to Gram's method demonstrate the presence of large numbers of streptococci. Tubercle bacilli are not detected in special preparations. The fluid when shaken up with ether loses some of its opacity, and from chemical analysis the quantity of fat, including lecithin, &c., is found to be 0·25 per cent. The fat is composed of finely divided globules, such as would occur in chylous fluid. For comparison we mention that Halliburton, quoting Hoppe-Seyler, gives the figure for total fats in human chyle as 2 per cent. roughly. There is undoubtedly pus present in the specimen, and a differential count shows 78 per cent. polynuclear leucocytes, while 22 per cent. are of the lymphocyte type. A typical streptococcus of the *pyogenes* type has been isolated from the specimen. The fluid was probably a chyle transudate admixed with pus, and much of its opacity is due to the presence of the latter.

(III) CHYLIFORM ASCITES ASSOCIATED WITH HEART AND LIVER DISEASE.

In 1906 I saw at Keswick, in consultation with Dr. Crawfurd, a female patient, aged 38, who suffered from mitral disease, an enormous liver, ascites, dropsy of the lower extremities, plum-coloured lips, and orthopnœa. When tapping of the abdomen was done the fluid, a sample of which was sent to me, was a dirty white colour, and on standing showed a creamy layer on the surface. No autopsy was permitted, but the case may possibly be placed among those in which a chyliform ascites has been due to heart and liver disease.

Laboratory Report (August 21, 1906).—This ascitic fluid is faintly alkaline in reaction, has a specific gravity of 1010, and contains a moderate quantity of albumin. Microscopical examination of the centrifugalized deposit: Many red blood disks are seen; these are doubtless due to the tapping. There are a few leucocytes, but no pus. Here and there is a wisp of fibrin due to spontaneous clotting. The milky appearance, in the absence of pus, confirms the suspicion of chyliform ascites, but the microscope shows no fat droplets, and but little of the deposit is extracted with ether. The opaque material is in the form of minute granules, some of these are fat in the finest stage of subdivision, and they stain with Sudan III. Other granules which do not stain with Sudan III are probably altered proteid, precipitated in a fine cloud, such as has frequently been observed both in chylous effusions and in lipæmic blood.

(IV) FATTY LAYER ON SURFACE OF ASCITIC FLUID IN A CASE OF CANCER.

The next case was one of ascites following removal of malignant cysts from the pelvis of a patient in 1906. The fluid when allowed to stand showed a layer of white cream on the surface, whilst below the fluid was darkened with blood and debris (fig. 5). This case belongs, I think, to the class where fatty degeneration of cancer cells may give a milky appearance to ascites, when the fat present is in sufficient quantity. The fat was only seen after the ascitic fluid had been standing for some hours. I have noticed a thin layer of fat on the surface of fluid from ordinary hydrocele fluid, which has been set aside for observation. In the *Transactions of the Pathological Society*, xxxv, p. 250, 1884, a hydrocele of many years' standing showed a fluid exactly resembling milk.

GENERAL REMARKS.

The literature on milky ascites is accumulating, in spite of the cases being few and far between, and I am anxious to acknowledge my indebtedness to Dr. Batty Shaw, to Dr. Rolleston, and others, for their valuable contributions with which English science has been enriched.

The interest in these cases lies very much in the fact that so many different causes may bring about a similar effect, so that, having a case of milky ascites in hand, it is by no means an easy matter to decide upon the originating cause. For example, of twenty cases collected by Rotman only two are attributed to tubercle; and of nine cases of milky fluids in the thorax only one was associated with tubercle. The chances are largely in favour of cancer, as six stands to two.

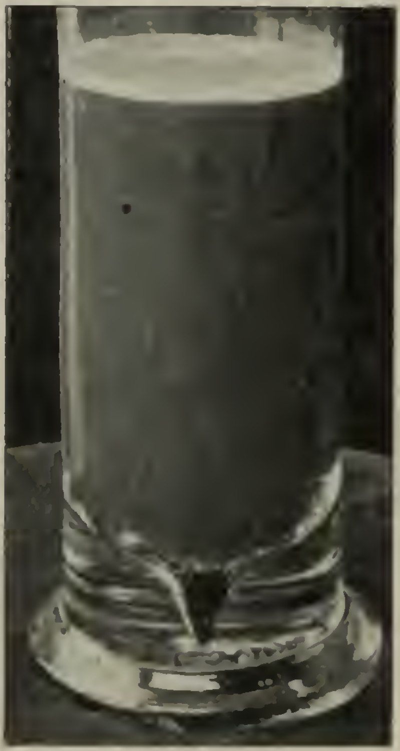


FIG. 5.

Fatty layer on surface of ascitic fluid from a case of cancer within the abdomen

According to some authors there is no clinical significance to be drawn from the nature of the fluids, but I think that chemical and microscopical examinations are of enormous aid in separating the many causes to which milky ascites may be attributed. A milky fluid may be pure chyle due to a leak, or it may be chyle which has transuded, or there may be in the fluid cells of various kinds, blood corpuscles, lymphoid cells full of fat granules, or epithelial cells with fat granules, and such additions to a milky fluid might indicate the presence of cancer within the abdomen, with chyle leaking or transuding from lacteal vessels.

Actual rupture of the receptaculum seems to be rarely met with; a transudation from distension of lacteals happens oftener. With a leakage of chyle from a perforated receptaculum it is very difficult to see what could be done, and even with a transudation of chyle due to pressure on the receptaculum of years' standing it might prove impossible to extricate matted glands. For example, in the case mentioned, where glands at the root of the neck apparently prevented the flow of chyle into the veins, liberation of the pressure by removal of the glands might, if carried out without damage to the duct or vein, have checked the transudation of chyle within the abdomen.

Faced with difficulties in dealing with disease marching on to an inevitable end, it is for the surgeon to afford relief to be obtained in no other way. I have a hope that a day may come when a remedial operation may be devised and carried out in cases of milky effusions or transudations within the abdomen or thorax. With dissemination of cancer, or of tubercle throughout the body, the chance of relief is gone, and the effort, if made at all, must be made in the early stages of the disease.

BIBLIOGRAPHY.

Achard. *Bull. et mém. Soc. méd. des Hôp. de Par.*, 1896, 3me sér., xiii, p. 773.
Achard et Laubry. *Bull. et mém. Soc. méd. des Hôp. de Par.*, 1902, 3me sér., xix, p. 295.
Boyd. *Edinb. Hosp. Repts.*, 1900, vi, p. 104.
Bradshaw. *Liverpool Med.-Chir. Journ.*, 1894, xiv, p. 252.
Burgess. *Lancet*, 1903, i, p. 1740.
Clarkson. *Lancet*, 1903, i, p. 960.
Corney and McRibben. *Boston Med. and Surg. Journ.*, 1903, cxlviii, p. 109.
Guinochet. *Lancet*, 1903, i, p. 1826.
Hutchison. *Trans. Path. Soc. Lond.*, 1902, liii, p. 274.
Jousset, André. "Les Humeurs opalescentes de l'organisme," Thèse de Paris, 1901.
Lambrior. *Rev. de méd.*, Par., 1905, xxv, pp. 607-19.
Menetrier et Gauckler. *Bull. et mém. Soc. méd. des Hôp. de Par.*, 1902, 3me sér., xix, p. 897.
Richardson. *Lancet*, 1905, i, p. 587.
Rolleston. Allbutt and Rolleston's "System of Medicine," 1909, vi, p. 822.
Ross. *Lancet*, 1902, ii, p. 1632.
Shaw, H. Batty. *Journ. Path. and Bact.*, Edinb. and Lond., 1900, vi, p. 339.
Idem. *Proc. Roy. Soc. Med.*, 1911, iv (Clin. Sect.), p. 112.
Souques. *Bull. et mém. Soc. méd. des Hôp. de Par.*, 1902, 3me sér., xix, p. 291.
Wallis, R. L. Mackenzie, and H. A. Schölberg. "On Chylous and Pseudo-chylous Ascites" (part i), *Quart. Journ. of Med.*, Oxf., 1910, iii, pp. 301-12; (part ii), 1911, iv, pp. 153-201.

Chylous and Pseudo-chylous Ascites.

By R. L. Mackenzie Wallis.

Since publication of a paper by Dr. Schölberg and the writer in the *Quarterly Journal of Medicine* an analysis of milky fluids from three other cases has been carried out. These cases were:—

(1) An abdominal aneurysm under the care of Dr. Langdon Brown.

(2) A case of tuberculous peritonitis under the care of Dr. Samuel West.

(3) A case of hip disease with amyloid deposit in the spleen and elsewhere, under the care of Mr. W. Girling Ball.

In all three cases the fluids presented the characters which correspond to those laid down for pseudo-chylous ascites, and these are briefly summarized in a later part of this paper.

Previous to 1860 there were twenty-five cases of milky peritoneal effusions recorded, and during the last fifty years we were able to collect 171 cases. These together with the three cases recently examined make a total of 174.

Classification.—With regard to the classification of these milky effusions in the paper referred to, the division into three groups as originally proposed by Quincke was criticized. His classification was based upon the presence of fat in varying quantities, and this was shown to give misleading results. The classification given by Rolleston in Allbutt and Rolleston's "System of Medicine" is a modification of that propounded by Quincke and includes three groups—namely, chylous, chyliform, and milky non-fatty effusions. Now chyliform effusions are frequently such not because of the fat, which may be present in considerable amount, but by reason of some other substance which is identical with that causing the opalescence in milky non-fatty effusions. The two groups, therefore, are hardly distinct enough to justify a main heading and it was proposed to include them under pseudo-chylous effusions. The chylous effusions would still include those already described by Quincke as resulting from trauma, or disease, of the lacteal and lymphatic vessels.

With regard to the morbid anatomy, the commonest lesions found in all cases were malignant disease, tuberculous infection, cirrhosis of the liver, and chronic nephritis. These lesions are typical of pseudo-chylous effusions. Changes in the blood-vessels or affections of the thoracic duct are striking by their almost complete absence. The three cases of syphilis, and the five cases in which amyloid deposition occurred, were all found associated with a pseudo-chylous effusion.

Microscopical Examination of Milky Effusions. — The most important point which can be determined by microscopical investigation is the presence or absence of free fat, or of cells containing degeneration fat. This information gives a good idea of the quantity of fat present, as shown by subsequent chemical analysis. The absence of microscopical free fat is evidence in favour of a pseudo-chylous effusion, whilst the presence of free fat gives no information one way or the other unless a complete chemical analysis is made.

Chemical Analysis.—Before detailing the scheme of procedure which is necessary to establish whether a milky effusion is chylous or pseudo-chylous, a brief summary of the points of distinction between chylous and pseudo-chylous effusions will be given :—

CHYLOUS ASCITES.	PSEUDO-CHYLOUS ASCITES.
(1) Tends to accumulate very rapidly, and in consequence large volumes are removed at paracentesis.	(1) Collects more slowly, the volume of the fluid varying with the exciting pathological condition.
(2) Generally yellowish-white in colour and less perfectly emulsified.	(2) In colour a pure milky white solution in the form of an almost perfect emulsion.
(3) Degree of opalescence more or less constant at successive tappings.	(3) The opacity generally increases or diminishes at successive tappings, and in some instances may be quite clear.
(4) Possesses an odour corresponding to the odour of the food ingested.	(4) Odourless.
(5) Microscopically the fluid contains fine fat globules, but very few cellular elements.	(5) Microscopically the quantity of free fat is variable ; often numerous fine, highly refractile granules are present, and these do not give the reactions for fat. Cellular elements may be numerous and often contain fat ; sometimes very scanty.
(6) Generally shows a distinct creamy layer on standing.	(6) A cream may or may not form, but does not affect the opalescence ; a sediment frequently settles out.
(7) Specific gravity generally exceeds 1012.	(7) Specific gravity less than 1012.

CHYLOUS ASCITES—(*continued*).	PSEUDO-CHYLOUS ASCITES—(*continued*).
(8) Depression of freezing point about 0·51 C., and approximating that for chyle.	(8) Depression of freezing point ranges from 0·56° to 0·61 C., and thus corresponds to the figures for blood serum.
(9) Total solids vary considerably, but usually greater than 4 per cent.	(9) Total solids rarely exceed 2 per cent.
(10) The total protein content generally exceeds 3 grm. per cent., and of this the serum-albumin is the largest fraction, globulin occurring only in traces.	(10) The protein constituents vary between 1 and 3 grm. per cent., and of these the serum globulin occurs in appreciable quantities.
(11) Mucinoid substances absent.	(11) Mucinoid sometimes present.
(12) The fat content is generally high, varying from 0·4 to 4 per cent. The fat corresponds in all its properties to the fat contained in food.	(12) The fat content is generally low, and may be present in traces only; in its melting point and chemical composition it proves to be pathological fat.
(13) Of the lipines cholesterol is invariably found, and lecithin only occurs in traces.	(13) The most characteristic lipine is lecithin, though cholesterol is occasionally present.
(14) No evidence of the presence of a lipine-globulin combination has been given by previous observers.	(14) The lecithin is mainly combined with the globulin, and when present is the cause of the opalescence of the fluid. Such fluids resist putrefaction.
(15) The salts and the organic substances present approximate to the values found for chyle obtained from the thoracic duct.	(15) The salts and organic materials correspond closely to lymph and serous fluids.

It will be seen from the above table that the following points must be determined in order to ascertain whether a given milky fluid is chylous or pseudo-chylous in nature. The specific gravity, total solids, and ash must be ascertained as soon as possible after withdrawal. The fat and lipines may be removed in several ways, either by ether extraction of the fluid or extraction with hot alcohol. The ordinary method of extraction with ether has, however, many disadvantages, chief amongst them being the fact that the proteins present are partially precipitated and in pseudo-chylous effusions the lecithin as well. If the proteins are precipitated with alcohol, and the residue repeatedly extracted with hot alcohol or ether, the lipines and fat are entirely removed. The residue can then be extracted with ether, and the fat and other ether-soluble substances isolated. The nature of the fat, its melting point, its saponification number, and ether number should be observed, as by this means a distinction between normal human fat and pathological fat can be made. The presence of lecithin and its condition in the fluid in also of importance, and this can be established either by precipitation methods or by dialysis. The presence or absence of sugar appears to be of little value for diagnostic purposes, since it may or may not be present in either type of effusion. The other organic constituents, such as urea, uric acid, bile components, occur in very small quantities, and are apparently of no special significance. The presence of such inorganic salts as chlorides and phosphates may be ascertained by the analysis of the ash. Finally, the depression of the freezing point should be determined, as this gives an indication of the quantity and distribution of the inorganic salts present.

DISCUSSION.

Dr. RYFFEL said he had met with two cases of milky effusion which might be interesting for comparison with those mentioned by Mr. Mackenzie Wallis. The first occurred in the later stages of a case of chronic nephritis. The fluid corresponded exactly with that described by Mr. Wallis as being characteristic of pseudo-chylous ascites, the opalescence being mainly due not to fat globules, but to minute particles of a lecithin-globulin complex. In the other case a milky fluid was found in the pleural cavity, the origin of which was not clearly made out at the post-mortem, but as there were sarcomatous deposits in the posterior mediastinum it probably had a lymphatic origin. The specific gravity and protein content of the liquid were high. Globules of fat were present but did not account for all the milkiness of the fluid. This was in large part due to minute particles which did not separate on centrifugalizing, but were removed by filtration through a Pasteur candle and were precipitated by half saturation with ammonium sulphate. On repeated shaking with ether the liquid became nearly clear and the material extracted consisted largely of an ester of cholesterol which crystallized from acetone in the form of fine needles radiating from a centre. The minute particles in the liquid appeared to consist of an association of globulin with an ester of cholesterol and to be similar to those found in the serum of some cases of lipæmia. In all probability as the liquid of true chylous ascites always contained cholesterol its milkiness was always partly due to such particles which differed from those of pseudo-chylous ascites in containing cholesterol instead of lecithin.

Dr. ROBERT HUTCHISON asked whether Mr. Mackenzie Wallis was of opinion that *all* pseudo-chylous fluids were due to this lecithin-globulin compound; did he regard it as pathognomonic? It seemed to him that there were several things which might produce opalescence. There appeared no reason why it should not be a nucleo- or a para-nucleo-proteid, like casein, which caused an opalescent solution. In a case which he examined some years ago, with the help of a very competent physiological chemist, it seemed that the substance was a nucleo-compound; they could not find lipoids, either free or in combination. The case was published in the *Pathological Society's Transactions.*[1] Possibly, however, the methods used in that case were faulty, and by proceeding along other lines, lecithin might have been found in combination with the globulin. All work of the kind now brought forward was interesting to the physiological chemist, but pseudo-chylous ascites was perhaps receiving more attention than it deserved, clinically, for it seemed to have no diagnostic value. The patient whose fluid he examined was the subject of chronic nephritis, and a considerable number of such cases had nephritis. They had also been recorded in association with malignant disease.

Dr. DRUMMOND read a report he had received from a physiological chemist in Newcastle upon a specimen of milky ascites he had submitted for investigation. He was encouraged to do so inasmuch as the result seemed to confirm Dr. Hutchison's remark as to the possibility of the substance being a nucleo-protein. He stated that, in his opinion, one of the most interesting clinical features connected with cases of chyliform ascites was the relation of syphilitic disease of the kidneys to the condition. He had met with a number of cases in which nephritis had developed, apparently in consequence of syphilis, in which the ascitic fluid was milky, and he thought a striking and almost diagnostic feature was to be found in the fact that the abdominal fluid was greatly in excess of the general dropsical swelling. As a rule there was little or no œdema of face or arms and comparatively slight swelling of the legs. He had only met with one post-mortem examination in cases of the kind, and the kidneys were found to be lardaceous, but in this patient's case there was extensive tuberculosis of the lungs as well as a syphilitic history. He had met with other cases of kidney disease as well as cirrhosis of the liver with milky ascites in which there was no history of syphilis, and he did not consider that this variety of effusion was peculiar to the specific form of disease, but he considered the question of great importance from the diagnostic point of view, as the specific cases appeared to be amenable to treatment. He related a case of a sea captain, aged 34, who developed nephritis about two years after he had acquired syphilis. The ascitic fluid in this case accumulated rapidly and the abdomen was tapped six or eight times at intervals from eight days to a fortnight. The fluid remained milky the whole time but gradually became smaller in quantity. The urine was highly albuminous and contained a number of granular, fatty, and epithelial casts. He was treated by large doses of iodide of potassium and made a good recovery, and now for some three and a half years had been back to duty in charge of his ship with his health restored and the urine free from albumin.

---

[1] *Trans. Path. Soc. Lond.*, 1902, liii, p. 274.

Dr. F. PARKES WEBER said that in regard to effusions which were not really chylous, but were more or less "milky" or "opalescent" or "soapy" in appearance, it was clinically convenient to distinguish those in which a white fatty layer separated when the fluid was allowed to stand from those in which no such layer occurred. He doubted whether in the opalescent ascitic fluid from cases of syphilitic nephritis any such fatty layer had ever been observed. In a "case of nephritis with ascites, bilateral hydrothorax and general œdema in secondary syphilis," which he showed at the Clinical Section on February 14, 1913,[1] the ascites itself was never tapped, but the fluid in the right pleura was observed at one time to have a soapy appearance. In the case of a man, aged 28, shown by Dr. H. Batty Shaw at the Clinical Section on February 10, 1911,[2] chyliform ascites occurred during the period of secondary syphilis. Syphilitic nephritis (of which the most typical cases were probably those of the early or secondary stage of syphilis) was rare, and he doubted whether the opalescent or soapy appearance of a serous effusion could be regarded as confirming the syphilitic origin of the effusion in question.

Dr. LEDIARD, in reply, reminded the meeting that he had advanced no dogmatic views, and therefore no attack remained to be dealt with in the answer. He had seen a creamy or fatty layer on the surface of a hydrocele which had been tapped many times, and that without any thickening of the tunica. The patient was a man, aged 80, and the layer was due to fat globules. The patient had not returned since. He expressed his indebtedness to those who had taken part in the discussion.

Mr. MACKENZIE WALLIS, in reply, called attention to the instances in the literature where the opalescence of milky effusions was ascribed to a nucleo-protein. In the paper previously mentioned, the similarity between the lecithin-globulin compound isolated from these fluids and a nucleo-protein was discussed, and the view there expressed that some writers had fallen into an error. Unless a careful analysis was made, and the presence of nucleic acid and its degradation products definitely proved, it was impossible to draw any conclusions as to the presence of a nucleo-protein. In view of the evidence obtained from several cases, and the corroboration received from Dr. Ryffel and others, it seemed highly probable that all pseudo-chylous fluids owed their opalescence to the lecithin-globulin complex. The case described by Dr. Hutchison was no doubt similar. Dr. Batty Shaw mentioned a case of great interest inasmuch as the lecithin-globulin compound had been isolated from the blood serum. This was in accordance with the observations of the speaker on the serum-globulin content of the blood in normal and pathological conditions. This protein fraction of the serum was found to have in association with it various lipoids such as cholesterol esters, and also fatty acids. In answer to Dr. Parkes Weber, he believed the triple classification of milky effusions was based entirely upon the fat content. The fluids differed so markedly in their fat content, and since it had been shown conclusively that the fat played either no part or only a minor part in the opalescence, the classification should be regarded as valueless. Many serous effusions contained more fat than some milky effusions, and therefore should strictly be placed in this group if the old classification were still retained. He maintained that the simple classification into chylous and pseudo-chylous satisfied not only the chemical findings, but was also of more value from a clinical point of view. He had been much interested in the cases so fully described by Dr. Lediard, and especially in the fluids shown. With regard to Case II, it appeared that the fluid became less opalescent on treatment with ether, and gave a fat content of 0·25 per cent. In order to establish whether the fluid was chylous or pseudo-chylous in nature an analysis carried out on the lines indicated in the paper was necessary. Since the publication of the papers by Dr. Schölberg and the speaker three new cases had been examined, and all the conclusions previously arrived at received corroboration, and it was very interesting to find that Dr. Ryffel and others had obtained similar results.

---

[1] *Proceedings* (Clin. Sect.) p. 159; *see* also F. P. Weber, *Edinb. Med. Journ.*, N.S., 1913, x, p. 348.

[2] *Proceedings*, 1911, iv (Clin. Sect.), p. 112.

PROCEEDINGS

OF THE

ROYAL SOCIETY OF MEDICINE

VOLUME THE SIXTH

COMPRISING THE REPORT OF THE PROCEEDINGS FOR THE
SESSION 1912-13

NEUROLOGICAL SECTION

LONDON
LONGMANS, GREEN & CO., PATERNOSTER ROW
1913

Neurological Section.

OFFICERS FOR THE SESSION 1912-13.

President—

H. H. Tooth, M.D., C.M.G.

Vice-Presidents—

W. Thorburn, F.R.C.S.
H. G. Turney, M.D.

Hon. Secretaries—

Wilfred Harris, M.D.
T. Grainger Stewart, M.D.

Other Members of Council—

H. K. Anderson, M.D.
A. Stanley Barnes, M.D.
E. Farquhar Buzzard, M.D.
F. L. Golla, M.B.
C. M. Hinds Howell, M.D.
F. W. Mott, M.D., F.R.S.
Leslie Paton, F.R.C.S.
Purves Stewart, M.D.
W. H. B. Stoddart, M.D.
H. Campbell Thomson, M.D.
S. A. K. Wilson, M.D.
Guy E. M. Wood, M.B.

Representative on Library Committee—

F. E. Batten, M.D.

Representative on Editorial Committee—

T. Grainger Stewart, M.B.

NEUROLOGICAL SECTION.

CONTENTS.

October 31, 1912.

PAGE

Presidential Address: Some Observations on the Growth and Survival-period of Intracranial Tumours, based on the Records of 500 Cases, with Special Reference to the Pathology of the Gliomata. By H. H. Tooth, M.D., C.M.G. 1

November 21, 1912.

? Pituitary Tumour. By H. Campbell Thomson, M.D. 49

? Peroneal Atrophy. By James Taylor, M.D. 50

Congenital Cerebellar Ataxy. By Leonard Guthrie, M.D. 51

By E. G. Fearnsides, M.B.

- (1) Nystagmoid Movements of Palate and Lids. Lateral and Rotatory Nystagmus. Cerebellar Incoördination 53
- (2) Tetanus; Chloretone Poisoning: Recovery; followed by Polyneuritis 54

Family Myoclonus. By Purves Stewart, M.D. 58

By E. Farquhar Buzzard, M.D.

- (1) An Obscure Case of Athetosis, with Abolition of Tendon Reflexes ... 60
- (2) Post-encephalitic Diplegia with Involuntary Movements 61

Atrophy of Distal Muscles in all Four Extremities. ? Cause. By F. E. Batten, M.D. 62

By James Collier, M.D.

- (1) Unilateral Tremor resembling that of Paralysis Agitans in a Child ... 64
- (2) Two Members of a Family in which Visual Defects and Loss of Knee-jerk have occurred during Three Generations 64

? Unilateral Friedreich's Disease. By T. R. Elliott, M.D. 66

Spinal Tumour and Scoliosis; Recovery after Operation. By Wilfred Harris, M.D., and A. S. B. Bankart, F.R.C.S. 67

Jacksonian Attacks. By F. M. R. Walshe, M.B. 68

Partial Third Nerve Paralysis with Rhythmic Movements of the Pupil. By R. A. Greeves, F.R.C.S. 68

January 16, 1913.

PAGE
Myasthenia Gravis. By JAMES TAYLOR, M.D. 69
Tremor of Uncertain Origin. By ALDREN TURNER, M.D. 70
Trophic Changes of Obscure Origin. By HARRY CAMPBELL, M.D. 71

By JAMES COLLIER, M.D.

(1) Two Sisters presenting a similar Right-sided Hemiparesis and Stunting of Growth dating from Birth 72
(2) Case for Diagnosis: Slowly on-coming Cerebellar Ataxia, with Facies resembling that of Myasthenia Gravis 74
(3) Case for Diagnosis. ? Cerebellar Ataxy presenting Typical Symptoms of Disseminated Sclerosis in an Undersized Boy, aged 13 ... 75
Shoulder-joint Lesions in Syringomyelia. By T. R. ELLIOTT, M.D. 77
Jacksonian Epilepsy. By C. M. HINDS HOWELL, M.D. 78
Athetosis of Left Hand with Tremor of Right Hand. By E. G. FEARNSIDES, M.B. 81

By F. FARQUHAR BUZZARD, M.D.

(1) Muscular Atrophy of Left Upper Limb 84
(2) Myasthenia Gravis 85
Paralysis of Right Lower and Middle Trapezius. By GEORGE JOHNSTON, M.D. ... 85

April 17, 1913.

Gumma Cerebri: Results of Treatment. Some Histological Features. By HOWARD H. TOOTH, M.D., C.M.G. 87
Cerebral Symptoms in a Bulldog associated with Lymphocytic Infiltration of the Vessels and Membrane of the Brain and Spinal Cord. By FREDERICK E. BATTEN, M.D. 111
The Clinical History and Morbid Anatomy of a Case of Generalized Sclerodermia with Severe Muscular Atrophy. By JAMES COLLIER, M.D., and S. A. KINNIER WILSON, M.D. 119

May 22, 1913.

Lipodystrophia Progressiva. By F. PARKES WEBER, M.D. 127
Rapid Wasting of Muscles of Hands and Arms. ? Cause. By H. CAMPBELL THOMSON, M.D. 134
Primary Progressive Myopathy: Facio-scapulo-humeral (Landouzy Déjerine) Type; Advanced Stage. By FREDERICK S. PALMER, M.D. 136
? Atrophic Myotonus. By WILFRED HARRIS, M.D. 138
Progressive Double Hemiplegia. By H. H. TOOTH, M.D., C.M.G. 140
Friedreich's Ataxia in an Undersized Girl, aged 10. By JAMES TAYLOR, M.D. ... 14

SECTIONS OF NEUROLOGY AND OPHTHALMOLOGY

(Combined Meeting).

(NOTE.—This portion is independently paged in Roman numerals so that it may be bound at the end either of the Neurological Section or of the Section of Ophthalmology.)

March 5, 1913.

DEMONSTRATION OF CASES OF DISEASE OF THE PITUITARY BODY.

PAGE

Notes of Three Cases. By H. L. EASON, M.S. i

By GORDON HOLMES, M.D.

(1) Pituitary Tumour with Symptoms of Dystrophia Adiposo-genitalis ... ix

(2) A Pituitary Tumour with Early Acromegaly x

Two Cases of Bitemporal Hemianopsia, with other Evidence of Pituitary Tumour. By N. BISHOP HARMAN, F.R.C.S. xi

Pituitary Disease. By THEODORE THOMPSON, M.D. xvii

Pituitary and (?) Adrenal Syndrome. By H. G. TURNEY, M.D. xviii

Precocious Development in a Boy, aged 8. By F. J. POYNTON, M.D. xviii

Pituitary Tumour. By T. GRAINGER STEWART, M.D., and HERBERT PARSONS, F.R.C.S. xx

A Typical Case of Acromegaly, with Signs of Regression. By S. A. KINNIER WILSON, M.D. xxii

Pituitary Tumour: Symptoms of Failure of Posterior Lobe Function. By T. GRAINGER STEWART, M.D., and ELMORE BREWERTON, F.R.C.S. ... xxiii

Pituitary Tumour (Lorain Type); Small Adult Body with Retarded Sexual Development, but no Adiposity; Failure of Function of Anterior Lobe. By T. GRAINGER STEWART, M.D., and R. RUTSON JAMES, F.R.C.S. ... xxv

Case of Acromegaly. By W. H. WILLCOX, M.D. xxvi

Acromegaly: Pituitary Tumour showing the Failure of the Fields for Colour before the Failure of the White Field. By R. W. DOYNE, F.R.C.S. ... xxviii

Cerebellar Ataxia with Symptoms of a (? preceding) Hypophyseal Lesion. By JAMES COLLIER, M.D. xxx

Hypopituitarism—Dystrophia Adiposo-genitalis. By F. E. BATTEN, M.D. ... xxxi

Hyper-activity of Anterior Lobe combined with Deficient Action of Posterior Lobe. By E. CECIL WILLIAMS, M.B. xxxii

DISCUSSION ON DISEASE OF THE PITUITARY BODY.

The Structure and Functions of the Pituitary Body. By E. A. SCHÄFER, F.R.S.... xxxiv

Mr. J. HERBERT FISHER liii

March 12, 1913.

Discussion on Disease of the Pituitary Body (*continued*):—

Dr. H. G. Turney (p. lxix)—Dr. A. E. Garrod (p. lxxviii)—Dr. William Hill (p. lxxviii)—Mr. Graham (p. lxxxvii)—Dr. Langdon Brown (p. lxxxvii)—Mr. Richardson Cross (p. lxxxviii)—Dr. Grainger Stewart (p. xc)—Dr. Theodore Thompson (p. xcii).

The Council think it right to state that the Society does not hold itself in any way responsible for the statements made or the views put forward in the various papers.

John Bale, Sons & Danielsson, Ltd., 83-91, Great Titchfield Street, London, W.

Neurological Section.

October 31, 1912.

Dr. H. H. TOOTH, C.M.G., President of the Section, in the Chair.

PRESIDENTIAL ADDRESS.

Some Observations on the Growth and Survival-period of Intracranial Tumours, based on the Records of 500 Cases, with Special Reference to the Pathology of the Gliomata.

THE following observations form part of a general inquiry into the history, progress, treatment, fate, and, in many cases, the post-mortem findings of persons suffering from intracranial new growths who have come under observation at the National Hospital during the period of ten years, 1902-1911 inclusive.

I have here to make grateful acknowledgment of the permission of my colleagues to use the notes of their cases, and the ready help given me on all occasions, especially in the difficult matter of tracing the after-history of patients. As the numbers are large, and the notes in most cases voluminous, many being models of medical note-taking, it may not be out of place to say a word upon the method employed, especially as the value of some of the tables submitted depends *entirely* upon the accuracy of interpretation of the recorded clinical details, and the information received from the patients themselves, both of which constitute the main difficulty in an inquiry of this nature.

A careful abstract of the clinical features has been made upon a card under an index number, a running card-index of clinical points being made at the same time. This card also receives all other information that can be obtained, namely: (1) An account of operation, and further course of the case; (2) an abstract of the post-mortem examination—no small part of the task, which has been undertaken by my colleague

Dr. Howell, then pathologist, to whom I offer my best thanks; (3) an examination of the microscopical appearances; (4) all patients who have left the hospital have been written to—a circular letter with a short series of easily answered but sufficiently searching questions on the fly-sheet, and on the whole the answers have been intelligent, and of use in forming an opinion of the present state; 346 of these letters have been sent out, and 177 returned answers from patients or their friends; the remainder have not been answered, or the letters have been returned through the post. In forming tables of results, therefore, it has been necessary to assign a column of "No reply."

My junior colleagues who have in the last ten years served on the Resident Staff have kept in touch with some of these "No reply" cases to fairly recent dates, so this group affords some information of value. These facts are entered upon the cards.

During the ten years there have been in hospital 566 cases diagnosed as new growths, or as gummata. The gummata, 40 in all, have been rejected as requiring separate consideration. On close consideration, also, 26 cases have been eliminated for various reasons, not the least being the absence of optic neuritis. These rejections leave 500 cases of practically certain intracranial tumour, and it is from these that the facts and conclusions which follow have been gathered.

Table I presents the distribution of these tumours according to the regions of the brain involved. The larger number have been verified by operation or post-mortem examination. Many, of course, have been subjected to neither of these tests, but from the clinical details one may have little hesitation in accepting the diagnosis as correct, and these have been used for the estimation of the period of growth of tumours, whether still alive or since dead, without verification post mortem.

To show how difficult is this question of rejecting or retaining cases in the absence of verification, I must refer to two cases amongst the rejections. The first, a woman, aged 43 (Dr. Beevor), who had suffered nineteen years before from severe fits, ten years torticollis, and frequent faints, five months posterior headache, five weeks a Jacksonian convulsion, left hand and arm preceded by an aura in the same situation. On admission she presented the picture of right precentral tumour: mental levity, intense optic neuritis, blurred vision, left hemiplegia, exaggerated left deep reflexes. The brain was explored by Sir V. Horsley over the region indicated, and nothing was found. There was much bulging after, but the neuritis subsided to pallor, and she became almost blind. Six weeks after operation she had a series of fits, beginning with purposive movements of the right arm, becoming clonic later, and, as the fit subsided, similar movements on the left side, followed by coma. Nearly five months after she became alternately stuporose and noisy, again a series of right-sided fits, coma, and death from respiratory failure.

Table I.—Regional Classification of Cases of all Tumours, whether Verified or not.

Region	Sex		Total	Per cent.	
	M.	F.			
(1) Frontal	60	40	100	21·7	Fore-brain : 239. 52 per cent.
(2) Central pre- and post. Parietal	43	20	63	13·7	
(3) Temporo-sphenoidal ...	24	25	49	10·6	
(4) Occipital	8	6	14	3·0	
(5) Corona radiata ; corpus callosum, &c.	4	6	10	2·1	
(6) Lateral ventricle	2	1	3	0·6	
(7) Pituitary	10	4	14	3·0	
(8) Optic thalamus	4	2	6	1·3	
(9) Mesencephalon	18	8	26	5·2	Mid-brain : 30. 6·5 per cent.
(10) Pineal	4	—	4	0·8	
(11) Choroid plexus ; III and IV ventricles	4	1	5	1·0	
(12) Cerebellum	44	33	77	16·7	Cerebellum and pons : 160. 34·2 per cent.
(13) Extra-cerebellar	19	21	40	8·7	
(14) Pons	19	24	43	9·3	
(15) Medulla	—	1	1	0·2	
(16) Base	1	3	4	0·8	
Total	264	195	459		
(17) Not localized ...	24	17	41		
Grand total	288	212	500		

Post mortem no tumour was found, but great general rise of intracranial pressure, so as to force the posterior part of the cerebellar lobes down into the foramen magnum—so-called pressure-cone. Dr. E. F. Buzzard made some 500 sections of the brain, and failed to find any cause for the symptoms. This may not be a rare case—in fact, there have been three similar cases—but if the post-mortem findings were not to hand it would have come into my table as a tumour of the Rolandic area.

The second case was of optic neuritis with swelling without localizing symptoms. This was rejected as a case of family optic neuritis. Her sister had been in hospital one year before with the same symptoms, and eventually quite recovered. Both had suffered from severe headache, parietal and frontal, and both had been diagnosed as tumor cerebri. Again, there may be many such.

Therefore the group "Not localized" has little value, and is placed by itself in this table. It has been used in Table II, age-incidence, but in the other tables in which it occurs it is taken by itself on its own merits.

There can be little doubt that a fair number in this group are frontal and temporo-sphenoidal cases, latent or of slow growth; some may be deeply seated subcortical growths in the corona radiata or ventricles, regions of indefinite symptomatology. It will be seen that the two most vulnerable regions are the frontal and the cerebellum. But if we take the frontal and parietal together, which, considering the great tendency to overlapping, is a reasonable thing to do, and for the same reason we link together the cerebellum and pons, it is remarkable how closely in the respect of vulnerability these two antipodal regions correspond—i.e., fronto-parietal 163 cases, ponto-cerebellar 160—making together more than half the total of all growths, whether verified or not, for all regions.

In the fore-brain, which includes the first six regions in Table I, and which claims 52 per cent. of the whole number, the frontal group heads the list with 100 cases, 21·7 per cent. of the total, and 41·8 per cent. of the fore-brain. We have much exact knowledge both of localization and of the characters of the growths of this region, by reason of the fact that operations have been performed in 74 per cent. of the cases. The central group is smaller, 63, but owing to the comparatively clear and definite symptomatology of the motor region, operations have been performed in a yet larger percentage of cases—i.e., 52 out of 63, or 82·5 per cent.

Of tumours of the temporo-sphenoidal region we have a fair number, 49. The diagnosis of lesions of this region is among the most difficult,

TABLE II.—AGE AT APPEARANCE OF FIRST SYMPTOM FOR ALL GROWTHS, VERIFIED OR NOT.

Region	SEX		Total	1—20 YEARS		21—30 YEARS		31—40 YEARS		41—50 YEARS		51—60 YEARS		61—70 YEARS	
	M.	F.		No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
(1) Frontal	60	40	100	9	9·0	30	30·0	39	39·0	14	14·0	7	7·0	1	1·0
(2) Central (parietal)	43	20	63	9	14·2	12	19·0	19	30·0	16	25·3	6	9·5	1	1·5
(3) Temporo-sphenoidal	24	25	49	10	20·4	14	28·5	18	36·7	5	10·2	2	4·0	—	—
(4) Occipital	8	6	14	2	14·2	4	28·5	1	7·1	3	21·4	4	28·5	—	—
(5) Corona radiata corpus	4	6	10	1	10·0	3	30·0	—	—	2	20·0	4	40·0	—	—
(6) Lateral ventricle	2	1	3	1	33·3	—	—	2	66·6	—	—	—	—	—	—
(7) Pituitary	10	4	14	2	14·2	6	42·8	4	28·5	2	14·2	—	—	—	—
(8) Optic thalamus	4	2	6	1	16·6	1	16·6	2	33·3	2	33·3	—	—	—	—
(9) Mesencephalon	18	8	26	12	46·1	9	34·6	3	11 5	1	3·8	1	3·8	—	—
(10) Pineal	4	—	4	1	25·0	2	50·0	—	—	1	25·0	—	—	—	—
(11) Choroid plexus, III and IV ventricles	4	1	5	1	20·0	2	40·0	—	—	2	40 0	—	—	—	—
(12) Cerebellum	44	33	77	47	61·0	14	18·1	10	14·2	3	3·8	3	3 8	—	—
(13) Extra-cerebellar ...	19	21	40	5	12·5	7	17·5	19	47·5	6	15 0	2	5·0	1	2·5
(14) Pons	19	24	43	23	53·4	7	16·2	8	18·3	5	11·6	—	—	—	—
(15) Medulla ..	—	1	1	1	—	—	—	—	—	—	—	—	—	—	—
(16) Base	1	3	4	1	25·0	—	—	—	—	1	25·0	2	50·0	—	—
(17) Not localized	24	17	41	13	31·7	12	29·2	12	29·2	2	4·8	2	4·8	—	—
Totals	288	212	500	139	—	123	—	137	—	65	—	33	—	3	—

yet a large number, 32, or 65·1 per cent., have come to operation and with a lower mortality than in the two preceding groups. The occipital group is much smaller, only 14, and as the localization is not difficult owing to the rather sharp symptomatology referable to the optic radiations and angular gyrus, it may be inferred that tumours in this region are comparatively rare. Operations have been performed in seven cases—i.e., 87·7 per cent. The mid-brain group includes 26 cases, to which may be added the pineal cases, making together 30, or 6·5 per cent. of the whole. The diagnosis of these lesions has been made more practicable by the work of Drs. Head and Holmes, and probably in the future the percentage of this group will be higher, but I fear surgery offers little hope of help in dealing with such cases.

The cerebellum proper offers 77 cases, 16·7 of the whole, and as the clinical indications are fairly well marked, this is probably a true figure; 36, or 46·7 per cent., have been verified by operation.

Of the extra-cerebellar group, 5 are gliomata and 13 fibrogliomata, and therefore primary in the cerebellum, but as their line of growth was almost entirely in the lateral recess, I have included them in this group. There were 40 in all, and 32, or 80 per cent., came to operation.

Of tumours of the pons there were 43, or 9·3 per cent.: they require no comment in this connexion.

Growths of the medulla must be very rare. I find record of only 1, an infiltrating glioma.

Table II: Age at appearance of first symptom.—This, of course, is not necessarily a true indication of the age of the tumour, which may have existed in a latent state for any length of time. The table requires little comment. Its value is regional only. Of tumours of the fore-brain generally, 142, or 59·4 per cent., made their first manifestation between the ages of 21-40; 32 only, or 13·4 per cent., between 1-20; 63, or 26·7 per cent., between 41-60; and only two in the last decennium, one of which was strictly 72.

Of the mid-brain group 21, or 80·7 per cent., appeared first between ages 1-30, 12 of these falling between 1-20. Of the ponto-cerebellar tumours (excluding extra-cerebellar; in 70 cases, or 58·3 per cent., symptoms appeared first between 1-20, 21, or 17·3 per cent., between 21-30, 18, or 15 per cent., between 31-40, and only 8, or 6·6 per cent., between ages 41-50.

But the extra-cerebellar group more nearly resembles in age-incidence the fore-brain tumours, in that the larger number, 19, or 47·5 per cent., fall between ages 31-40.

Table III.—Age at Appearance of First Symptoms for Growths of which the Nature has been Verified on Operation or Post Mortem.

Nature of growth	1—20 years				21—30 years				31—40 years				41—50 years				51—60 years				61—70 years				Total	Per cent.
	M.	F.	Total	Per cent.	M.	F.	Total	Per cent.	M	F.	Total	Per cent.	M.	F.	Total	Per cent.	M.	F.	Total	Per cent.	M.	F.	Total	Per cent.		
Glioma ...	9	16	25	19·6	25	12	37	29·1	25	7	32	25·1	14	5	19	14·9	8	5	13	10·2	—	1	1	0·7	127	49·2
Fibroglioma ..	—	2	2	13·3	—	4	4	26·6	2	4	6	40·0	1	2	3	20·0	—	—	—	—	—	—	—	—	15	5·8
Fibroma ..	2	2	4	30·7	—	—	—	—	7	2	9	69·2	—	—	—	—	—	—	—	—	—	—	—	—	13	5·0
Endothelioma	4	2	6	16·2	2	2	4	10·8	8	8	16	43·2	7	2	9	24·3	1	1	2	5·3	—	—	—	—	37	14·3
Sarcoma ...	3	—	3	14·2	5	—	5	23·8	5	1	6	28·5	3	3	6	28·5	—	1	1	4·7	—	—	—	—	21	8·1
Carcinoma .	—	—	—	—	—	—	—	—	3	—	3	20·0	3	3	6	40·0	3	2	5	33·3	1	—	1	6·6	15	5·8
Tuberculoma	4	5	9	64·2	2	2	4	28·5	1	—	1	7·1	—	—	—	—	—	—	—	—	—	—	—	—	14	5·4
Cyst, simple...	3	—	3	60·0	2	—	2	40·0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	1·9
Papilloma ..	—	—	—	—	1	—	1	33·3	—	—	—	—	1	1	2	66·6	—	—	—	—	—	—	—	—	3	1·1
Cholesteatoma	—	—	—	—	—	1	1	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	2	0·7
Pituitary ..	—	—	—	—	1	—	1	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	2	0·7
Pineal ...	1	—	1	—	2	—	2	—	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—	4	1·5
Totals ..	26	27	53	20·5	40	21	61	23·6	53	22	75	29·0	30	16	46	17·8	12	9	21	8·1	1	1	2	0·7	258	—

To sum up briefly, it would appear that tumours of the fore-brain tend to appear more frequently in middle age, but no age is exempt. Those of the mid-brain, on the other hand, appear first predominantly in the early or adolescent period, and the same may be said of the cerebellum and pons; comparatively few occur after 30.

Table III has perhaps more interest than the last, and though the figures are smaller they include verified cases, and are therefore of more value. The gliomata come first, 127, or 49·2 per cent., and it is seen that the numerical age-incidence for each decennium to 50 is fairly similar, but the largest number falls between 21-40. The fibrogliomata are few, but they conform in this respect with the last.

The same may be said of the endotheliomata: the largest number, 16, or 43·2 per cent., of the group falling between 31-40.

The sarcomata show practically the same age-incidence.

Carcinomata, as might be expected, appear in later periods, 31-60, but they are few.

Tuberculomata also are few, 14 only; of these 9 appear between 1-20, and only 1 between 30-40. The remaining growths are too few to base any conclusions upon.

Heredity.—In the records of cases heredity receives due attention. The class of patients at this hospital, generally speaking, is perhaps somewhat above that of general hospitals, so that diseases so striking as tumour of the brain, or cancer, might be expected not to be overlooked by the patient or friends. Yet among the 500 cases I find a cancerous heredity in no more than 37 cases, or 7·2 per cent. Of these 13 were in the father and 2 others on his side, 15 in the mother and 2 others on her side, 1 brother, 3 sisters, 1 aunt. In 10 the growth in the patient was glioma, in 2 fibroglioma, in 4 fibroma, in 2 endothelioma, and in 1 tuberculoma. In 17 the nature of the growth was not known.

In no case is there any family history of tumor cerebri. We may assume, then, that heredity is practically a negligible factor.

Table IV: Regional incidence of growths verified on operation or post-mortem examination.—The accuracy of this table depends upon the correct interpretation of the microscopical appearances of the section preserved, and some of them are so puzzling that their proper place in this table is almost a matter of opinion. With this reservation the table may be considered for practical purposes a true statement.

Glioma.—It is evident that of all growths the glioma is the largest in number and the most universal in its incidence. Of the total 258

TABLE IV.—REGIONAL INCIDENCE OF GROWTHS VERIFIED ON OPERATION OR POST MORTEM.

Region	No. of growths for each region	GLIOMA		FIBROGLIOMA		FIBROMA		ENDO-THELIOMA		SARCOMA		CARCINOMA		TUBERCU-LOMA		CYST		PAPILLOMA		CHOLESTEA-TOMA		PITUITARY		PINEAL ADENOMA	
		No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent
(1) Frontal ...	68	38	55·8	—	—	—	—	21	30·8	4	5·8	4	5·8	1	1·4	—	—	—	—	—	—	—	—	—	—
(2) Central ..	43	25	58·1	—	—	—	—	10	23·2	3	6·9	5	11·6	—	—	—	—	—	—	—	—	—	—	—	—
(3) Temporo-sphenoidal	27	17	62·9	—	—	—	—	4	14·8	2	7·4	2	7·4	2	7·4	—	—	—	—	—	—	—	—	—	—
(4) Occipital ...	6	4	66·6	—	—	—	—	—	—	1	16·6	1	16·6	—	—	—	—	—	—	—	—	—	—	—	—
(5) Corona radiata, corp. callos., &c.	8	6	75 0	—	—	—	—	—	—	1	26·5	1	26·5	—	—	—	—	—	—	—	—	—	—	—	—
(6) Lateral ventricle	3	1	33·3	—	—	—	—	—	—	2	66·6	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(7) Pituitary ...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—
(8) Optic thalamus	3	1	33·3	—	—	—	—	—	—	2	66·6	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(9) Mesencephalon	8	4	50·0	—	—	—	—	—	—	1	12·5	—	—	2	25·0	1	12·5	—	—	—	—	—	—	—	—
(10) Pineal ...	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—
(11) Choroid plexus, III and IV ventricles	4	—	—	—	—	—	—	—	—	1	25·0	—	—	—	—	—	—	3	75·0	—	—	—	—	—	—
(12) Cerebellum ...	34	18	52·9	—	—	1	2·9	1	2·9	3	8·8	1	2·9	6	17·6	4	11·7	—	—	—	—	—	—	—	—
(13) Extra-cerebellar	32	5	16·3	13	40·6	11	34·3	1	3·1	—	—	—	—	—	—	—	—	—	—	2	6·2	—	—	—	—
(14) Pons	12	7	38·3	1	8·3	1	8·3	—	—	—	—	—	—	3	24·9	—	—	—	—	—	—	—	—	—	—
(15) Medulla ..	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(16) Base crus, &c.	3	1	33·3	—	—	—	—	—	—	1	33·3	1	33·3	—	—	—	—	—	—	—	—	—	—	—	—
Totals ...	258	127	49·2	15	5·8	13	5·0	37	14·3	21	8·1	15	5·8	14	5·4	5	1·9	3	1·1	2	0·7	2	0·7	4	1·5

growths, 127, or 49·2 per cent., were gliomata. Grouping the regions as before, we find there are 91 gliomata, or 58·7 per cent. of all growths in the fore-brain. Again, in the mid-brain this class of tumour predominates to the extent of 50 per cent., but the numbers are few. In the cerebellum and pons, including the extra-cerebellar growths, there are 30 gliomata out of a total of 78, or 38·4 per cent.

Fibroglioma and Fibroma.—These are peculiar to the cerebellum and pons and the one medulla case. The fibroglioma is a growth which presents the features of glioma and fibroma, and I cannot yet say whether it is a distinct pathological entity or a true glioma in which the conditions of growth are in some way modified by its surroundings. I am inclined to think the latter, and if so it should be included among the gliomata.

In the peripheral parts of some of the gliomata in the fore-brain a tendency to the formation of fibrous stroma with elongation of nuclei is frequently seen, even to the extent of rough capsulation.

Endothelioma.—Endotheliomata are much less common, and they occur practically only in the anterior fossæ of the skull. The regions involved are therefore the frontal 21, central 10, and temporo-sphenoidal 4. Two only affected the posterior fossæ, one in the lateral recess and the other compressing the vermis. To these must be added two cholesteatomata, which were extra-cerebellar. This is a curious and interesting point, and it is difficult to explain why the endothelium of the falx, and only the anterior part of it, should be affected to the exclusion almost of all the rest of the great dura matral sheath. There were 35 endotheliomas of the three regions named, or 25·3 per cent. of all growths for those regions.

Sarcoma.—This group presents some difficulty in classifying, for, as will appear later, there are stages in the growth of the glioma which, if universal in the section, may be almost indistinguishable from some of the recognized forms of sarcoma. In any case the group is not a large one. Twenty-one cases only, or 8·1 per cent. of the whole. Six were undoubted round or spindle-celled sarcomas, 3 of them secondary growths, 1 to suprarenal, 1 to kidney, and the other, melanotic, to the eye. The remainder were primary, and no part of the brain can be said to be exempt.

Carcinoma.—Primary carcinoma is interesting from its comparative rarity. Of the total (15) 1 only is undoubtedly primary, and, from its peculiar appearance, of the choroid plexus. Seven may have been primary, that is, no growth was found elsewhere, but in one or two only the brain was allowed to be examined. The remaining 7 were secondary—the primary growth being mammary in 3, ovarian, suprarenal, pancreatic and rectal in the other 4.

Tuberculoma.—Verified cases are surprisingly few. It is often diagnosed, but deaths are few. The age-incidence is so young that no doubt large numbers of these cases go to children's general hospitals. It is also probable that many cases recover, and I suspect that many of the long survival-periods may include this class of tumour.

Cyst.—The simple cyst deserves attention. I can find record of only 5 in which the true character was verified. All were thin-walled, apparently structureless bags containing clear fluid. One was found post mortem in the mid-brain lying ventrally to the Sylvian aqueduct. The patient died unrelieved by a cerebellar decompression. The others were in the cerebellum, and three came to operation. Two of them were successfully drained and were known to be alive and well six or seven years after; in the other, by a mistake in localization the exploration was made on the wrong side and the patient died seven days after. The fifth case presented an uncertain symptom picture, though a mid-cerebellar growth was suspected; no operation was attempted and the patient died fifteen months after the first symptom in the London Hospital. The Medical Registrar has kindly sent me an abstract of the autopsy, at which was found a very thin-walled cyst, of the size of a golf-ball, lying between the two lobes of the cerebellum and pressing down upon the floor of the fourth ventricle. Here is a case that must fill one with regret; operation might reasonably be expected to have been quite successful. If simple cysts were common, that in itself would almost justify exploration in any cerebellar case indiscriminately, but 5 in 258 is 1·9 per cent., and if this is anywhere near the truth simple cyst is a rare condition. Many gliomas, one may say most of the more chronic forms, develop cysts containing semi-gelatinous fluid, the drainage of which often affords more than temporary mechanical relief, but there is little evidence that the ultimate growth of the tumour is to any extent modified.

Papilloma.—Papilloma of the choroid plexus is a rare condition; it occurred in 3 cases only. In one the growth was felt in the middle peduncle of the cerebellum, right lobe, and as much as possible removed, but the patient died ten days after. Another died of pneumonia, and the third died outside, but Dr. Holmes made an autopsy and found a choroid plexus tumour undergoing colloid degeneration. These growths present the appearance of simple adenomatous overgrowths of the normal tissue, but clinically they are as dangerous to life as any malignant growth, and their situation is such as to be out of the range of successful operation, even if they could be diagnosed with certainty.

The only case of undoubted primary carcinoma, alluded to above, presented the general features of a choroid plexus tumour, but the columnar cells of the papilloma are swollen into great round cells undergoing active multiplication. In this case also there were many small islands of secondary growth, mostly cortical, the largest being in the left Rolandic region. This region was explored and a cyst punctured, with the escape of 1 c.c. of colloidal fluid. The patient died of respiratory failure on the table. A papilloma, then, may take on highly malignant features.

Cholesteatoma.—One undoubtedly presented the characteristics of this class of tumour. It was extra-cerebellar in situation, found on operation in the right lateral recess, and removed successfully, but unfortunately the patient died seventy-five days after of sepsis. The tumour was encapsuled, and on incision exuded white, glistening, pultaceous matter consisting largely of cholesterin, and also some large epithelial cells. It proved impossible to preserve the crystals and the section now shows a structureless network with some granular detritus in its meshes. The other was also extra-cerebellar deeply in the right lateral recess. It was removed successfully piecemeal. The patient was seen a year after, but in a very poor condition, with all the old symptoms, severe vertigo, and ataxia, with mental enfeeblement and a large hernia. The tumour was described as white, hard, and encapsuled, but no cholesterin was noted at the time of operation. The section now is strikingly like the last.

It is probable that these growths are highly degenerate endotheliomata, and it is perhaps an unnecessary refinement of classification to place them in a group apart.

Pituitary.—The clinical features of pituitary tumour referable to pressure on the chiasma are so marked that the number 14, or 3 per cent. of the whole, probably represents the true percentage, though only 4 have been verified, all by operation. In 3 of these the tumour was removed more or less completely, and in the fourth partially only, the state of the patient becoming so bad that operation had to be suspended and the patient died nine hours after without recovering consciousness. Of the 3 that survived 2 died in about six months and the third survived three and a half years. It is probable that recurrence took place, and therefore a considerable degree of malignancy must be ascribed to these growths, at any rate if disturbed by operation. This result should be compared with the long survival of pituitary tumours considered below.

Pineal.—Clinically these tumours are undiagnosable as such, the symptoms being referable to mid-brain and internal hydrocephalus. There have been 4 cases in the ten years, 3 of which have been reported by Dr. Howell. The growth, which is of the nature of adenoma or adeno-sarcoma, tends to fill the third ventricle and to extend down the aqueduct of Sylvius to the fourth ventricle, infiltrating more or less widely the surrounding structure.

THE SURVIVAL-PERIOD OF TUMOURS FROM THE APPEARANCE OF THE FIRST SYMPTOM TO DEATH.

I now come to a most interesting part of the subject, an inquiry into the life-history of such tumours as have been verified post mortem, untouched by surgery, which therefore may be assumed to have run a natural course, for it is idle to suppose that, in the present state of knowledge, any therapeutic agent can modify, to any extent, the growth of any of the tumours now under consideration except the tuberculomata. And yet it must be within the experience of every physician that in many cases an extraordinary change for the better occurs during the period of rest and observation in the wards, so that important symptoms, pain, vomiting and the like, disappear, and even optic changes regress. This adds another difficulty in deciding upon the advisability of operative interference.

Table V includes patients who died in the wards and on whom a post-mortem examination was made. There were 65 of these, and the average in months of survival from the first symptoms is given for the regions and growths.

In the last column, "Not verified," is given the same average for patients in whom the diagnosis was reasonably certain, but who died outside, or on whom autopsy was not allowed; they number 43.

These periods are of sufficient significance to justify some consideration in detail, especially as the survival-period after operation is of paramount interest, which must be enhanced by comparison with these. The results of operations in this respect will form part of a report to the International Congress.

Glioma.—If we take the 22 gliomata of the fore-brain as a whole, we find that these survived for all sorts of periods from six weeks to nine years, and if we strike a rigid average for all these periods it is found to amount to 16·2 months. But among these 22 is one most exceptional survival-period, nine years, so much so that it seems justifiable to exclude it, and strike an average of the remaining 21. The result of this is to bring the average survival-period down to 10·1 months, and I think this is probably not far from the truth. It may be in excess somewhat because there were three other rather exceptional periods, namely, of four, four and a half, and three years, but on the other hand more cases to deal with might show still more of these long periods.

It will be noticed that the survival-period for the frontal region is the longest; the temporo-sphenoidal comes next with fewer figures, and the corona radiata last with still fewer. The central and occipital are too few to consider separately.

The mid-brain, ponto-cerebellar and base (interpeduncular space) may be fairly taken together, though the number is small, 11 in all. The shortest survival-period was twenty-four days, a glioma of the pons, and the longest was two years, also of the pons. The average survival-period for the 11 cases was 9·4 months, not much less than that for the fore-brain.

Fibroglioma and Fibroma came to operation in all cases but the two on this table.

Endothelioma.—There are too few to base conclusions of any value, 4 in the fore-brain and 2 in the cerebellum. These 6 give an average survival of 20·2 months. A rough estimate of the period of growth may be arrived at by averaging the period from the first symptom to the time of operation, in the operation cases, disregarding the result, whether good or evil. Perhaps this may give truer results than at first appears likely, for in some of the cases a fatal issue in any case could not have been long deferred. Thirty-one cases are available for this purpose with very variable survival-periods, for instance, 1 of twenty years or more, another of eighteen years, 3 of ten years, and the rest of all periods from seven years to six months, 1 only of two months. A strict average for all these gives four years as the average survival-period for this class of tumour, and on the whole this may not be far from the truth, though probably it errs on the side of under-estimation.

Sarcoma.—The figures again are few, only 5. The survival-period averages 11·2 months. One, however, a sarcoma of the optic thalamus, survived four years, which must be an outside time for sarcoma. If we

TABLE V.—AVERAGE SURVIVAL PERIOD IN MONTHS FROM FIRST SYMPTOM TO FATAL TERMINATION. NATURE OF GROWTH VERIFIED POST MORTEM.

Region	GLIOMA		FIBROGLIOMA		FIBROMA		ENDOTHELIOMA		SARCOMA		CARCINOMA		TUBERCULOMA		CYST		PAPILLOMA		NOT VERIFIED		Totals
	No.	Average in months	No.	Average in months	No.	Average in months	No.	Average in months	No.	Average in months	No.	Average in months	No.	Average in months	No.	Average in months	No.	Average in months	No.	Average in months	
(1) Frontal...	9	16	—	—	—	—	2	10 : 72	—	—	2	8	—	—	—	—	—	—	6	39	19
(2) Central... ..	2	7 : 108	—	—	—	—	1	4	1	2·5	1	7	—	—	—	—	—	—	3	6	8
(3) Temporo-sphenoidal	6	9	—	—	—	—	1	9	—	—	1	8	—	—	—	—	—	—	2	—	10
(4) Occipital ..	1	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	19	2
(5) Corona radiata	1	7	—	—	—	—	—	—	1	5	1	5	—	—	—	—	—	—	1	5	7
(6) Lateral ventricle	—	—	—	—	—	—	—	—	1	1·7	—	—	—	—	—	—	—	—	—	—	1
(7) Pituitary ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	48	1
(8) Optic thalamus ..	—	—	—	—	—	—	—	—	2	6 : 48	—	—	—	—	—	—	—	—	1	30	3
(9) Mesencephalon .	1	5	—	—	—	—	—	—	1	1·5	—	—	2	1·1 : 6	—	—	—	—	2	10 : 18	6
(10) Choroid plexus ..	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	7 : 24	—	—	2
(11) Cerebellum .	2	12	—	—	1	7	1	3	—	—	1	10	2	13 : 108	1	15	—	—	7	20	15
(12) Extra-cerebellar	2	6 : 18	—	—	—	—	1	12	—	—	—	—	—	—	—	—	—	—	2	12 : 33	5
(13) Pons	5	9	1	10	—	—	—	—	—	—	—	—	3	7	—	—	—	—	11	21	20
(14) Base	1	2	—	—	—	—	—	—	1	12	1	24	—	—	—	—	—	—	1	22	4
(15) Not localized	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	48	5
Totals ..	33	—	1	—	1	—	6	—	7	—	7	—	7	—	1	—	2	—	43	—	108

Where the number is more than two, averages are given. If only two, the survival-period for each is given, unless the two periods are almost equal. Decimal points omitted, except in single cases.

drop this, the remaining sarcomas give a period of 5·1 months, which perhaps is an under-statement.

Carcinoma.—Seven cases give an average survival-period of 10·1 months, probably an over-statement.

Tuberculoma.—In any case verified tuberculomata are few, 14, 7 of which came to operation. The 7 that remain give a strict average survival-period of 21·5 months, but in one case the growth had been in existence nine years; without this the survival falls to seven months. However, taking the survival-period to the time of operation, as was done in dealing with the endotheliomata, we find an average survival-period of 17·4 months. The probable explanation of these varied results is that tuberculomas present in their development periods of activity and of quiescence, determined by varying degrees of constitutitional resistance, and it is not too much to assume that such periods of latency may ultimately become permanent. This must surely be the explanation of some of the results shown in Table VI. The importance of an early tuberculin test need scarcely be urged, in view of medical treatment, for the results of surgical interference are far from encouraging.

Simple Cyst.—One might expect a simple cyst to have a long survival-period. Only one is forthcoming as fatal without interference, and that had given symptoms for fifteen months (*vide supra*). Mechanical pressure on the floor of the fourth ventricle no doubt was the immediate cause of death. But one can form no conception of how long this cyst had been in existence before making itself felt, and this, of course, applies to all growths. Four came to operation, and in them the survival-period averaged 12·3 months. Apparently these cysts, though rare, are progressive in their enlargement, and their progress is fairly rapid.

Papilloma.—Two cases ran a natural course and, as shown in Table V, survived seven months and two years respectively. Two came to operation and had shown symptoms six months and twelve months to the time of operation. One of these patients was alive four and a half years after. No conclusion can be arrived at in so few instances.

The column "Not verified" includes 43 cases in which the localization was sufficiently clear to justify placing them in the regions named. For various reasons operation was not thought advisable, or in a fair number of cases was refused by the patient. All these patients left hospital alive, and having been written to the information has come to hand that they have since died, and generally a date has been given. Some died in hospital, but an autopsy was refused. Of course, we have no idea of what class these tumours were, but nevertheless the survival-period is worthy of note. Averaging the 43 cases, we arrive at a survival-period of 24·3 months, a little over two years. The largest number of these, 20, are of cerebellum and pons.

TABLE VI.—AVERAGE SURVIVAL PERIOD IN YEARS FROM FIRST SYMPTOM FOR PATIENTS ALIVE OR FROM WHOM NO INFORMATION HAS BEEN RECEIVED. NATURE OF GROWTH NOT KNOWN.

Region	ALIVE TO DATE		NO REPLY		Total
	Number	Average in years	Number	Average in years	
Frontal	2	2 : 6	5	1·3	7
Central	—	—	3	2·6	3
Temporo-sphenoidal	2	4·6 : 6	5	2·4	7
Occipital	2	18	3	5·2	5
Corona radiata	—	—	—	—	—
Lateral ventricle	—	—	—	—	—
Pituitary	7	9·7	2	2·5 : 0·5	9
Optic thalamus	1	9	1	3	2
Mesencephalon	6	6·5	7	3·4	13
Choroid plexus	—	—	—	—	—
Cerebellum	13	5·7	13	1·4	26
Extra-cerebellar	—	—	3	2·5	3
Pons	5	6·9	12	1·5	17
Base	—		—	—	—
Not localized	13	5·2	19	2·8	32
Totals	51		73		124

There remains for consideration Table VI, which seems to me to be of some interest in spite of many weak points. It concerns a total of 124 cases of more or less clinically certain tumours of the brain, 22 in the fore-brain, 9 pituitary, 20 in the mid-brain, 46 in the cerebellum and pons, and 32 not localized at all. These cases fall in an

"Alive to date" column, 51, and of these I have certain information as to their survival and some idea as to their present condition, and a "No reply" column, 73; letters to the patients have been returned through the post.

A glance at the first column suffices to show a remarkably long survival-period. The average, excluding the pituitary group which deserves special notice, is 6·3 years. Grouping the regions as in former calculations, we find the fore-brain gives the long survival-period to date of 9·5 years, but this is exaggerated by 2 occipital cases of eighteen years, 1 probably a tuberculoma.

The mid-brain and optic thalamus together, 7 cases, give an average of 6·9 years, and the cerebellum and pons, 18 cases, in the same way give a survival-period of six years to date.

The pituitary groups seem to possess special significance examined in this manner, because the symptomatology of these tumours is so distinctive. It includes 7 cases. All had more or less intense optic atrophy, with progressive loss of sight, and at some time characteristic hemianopsia, though one patient replies that his sight has improved. The average survival-period for all of these is 7·5 years to present date. All of them had been diagnosed as pituitary cases, 2 seem doubtful, but their removal does not appreciably affect the average. Even if this is a gross over-statement it would appear that the growth of these tumours is naturally a slow one, and this is significant in view of the tendency to recurrence after operative treatment (*vide supra*).

In the "No reply" column the survival-period is naturally less striking, because it has to be calculated to the date at which the patient left hospital. It is therefore of little value, but the average survival to that date is 28·4 months. Many of these, of course, may not be alive.

Now I give these figures for what they are worth and they must be received with great caution, but they are sufficiently large to arrest attention and provoke speculation, too large, I think, to be ignored. Probably a certain number are gummata without a history of syphilis, many no doubt are tuberculomata, but it is quite possible that among them are quiescent or latent gliomata or endotheliomata. This is pure speculation, but I would recall the not infrequent instances of a long survival-period among the verified cases, proving that glioma even, and endothelioma certainly, may run very long courses. It is also significant that the cerebellum should supply a proportionately large number of the cases, namely, 26, 13 of which are alive still with an average survival of five and a half years; an equal number from whom no reply has come give an average of 1·4 years to the time of leaving hospital, which perhaps might safely be doubled or even trebled, but equally, of course, some may not be alive. The symptomatology of cerebellar tumours is sufficiently distinctive that the margin of error in diagnosis can scarcely be very great. The obvious objections to a table of this kind are the initial possibility of error in diagnosis, and ignorance of the nature of the lesion; so much has to be taken on trust, and the danger is that it may be taken too literally.

AN INQUIRY INTO THE LIFE-HISTORY OF THE GLIOMA FROM THE HISTOLOGICAL STANDPOINT.

Of all the growths that affect the brain the glioma stands first both in frequency and importance.

As shown above, of 258 cases in which the nature of the growth was verified 127, or 49·2 per cent., were of this class. Most of these I have examined myself, thanks to the labours of our pathologists during the last ten years, and they present a bewildering variety of histological appearances, and the difficulty of placing some of them seems almost insurmountable. This difficulty is rendered all the greater from the fact that the same tumour may present, sometimes within the compass of an ordinary section, grades of change of great variety, so that at one end of the section we are looking at an apparently innocent growth, and at the other a richly cellular mass, more like a malignant sarcoma, or in another place an area of necrosis. On the whole, this variety of appearances seems to be distinctive of the gliomata, and occurs more often, and in a higher degree, among them than in any other of the intracranial growths. To arrive at a just estimate of the malignancy of a glioma it is really necessary to make sections from the periphery to the centre, and this is not, of course, always possible.

The original conception of a glioma is that of a simple overgrowth of the connective tissue element of the brain. It is not common to find a tumour which presents this simple character throughout: the nearest approach to a typical instance is:—

Case 1.—This is from T. H., a man aged 42 (Sir W. Gowers), who had presented symptoms referable to the left frontal region of eighteen months' duration. Unfortunately the operation notes have been mislaid, and one can only find that the left frontal region was explored (Sir V. Horsley), and some part of the tumour removed, from which this section was made. The patient died at home not very long after, but the reply is very indefinite.

The histological features to note (fig. 1) are[1]:—

(1) A fine, loose-meshed glia reticulum.

(2) Delicately stained, barely visible glia-cells, with three or more branching processes, which divide into a fine reticulum which forms the stroma or connective tissue basis of the tumour. To show these elements a counter-stain, such as Van Gieson's, is necessary.

(3) Scattered over the section in not excessive numbers are the glia-nuclei, always deeply stained by hæmatoxylin. I call these "glia-nuclei" to distinguish them from the more histologically definite "glia-cells." Possibly they also are cells with an invisible cytoplasm. The term is provisional only. They should be fairly uniform as to size and not grouped, but even in this apparently innocent quiescent picture these cells tend to show an arrangement in circles or segments of circles, a feature to be referred to later when considering the more malignant types.

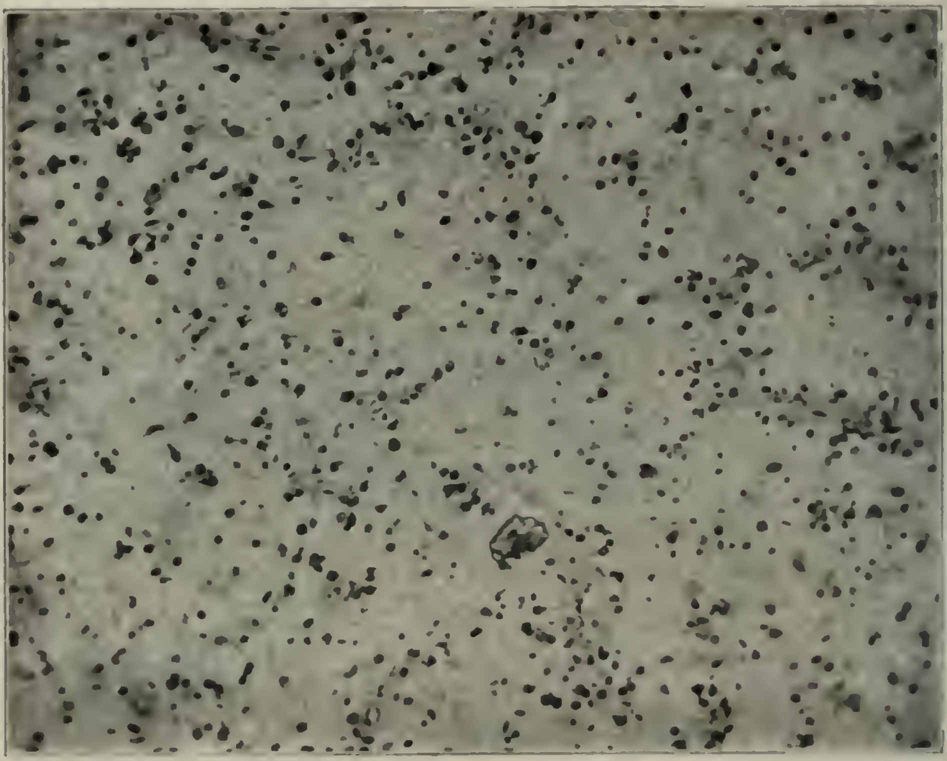


Fig. 1.

Case 1.—Section of a glioma of a low degree of malignancy. Frequent arrangement of nuclei in circles or semicircles of very varying diameters, also in places in almost straight lines.

(4) The blood-vessels are few and their walls lined internally by a single layer of flattened endothelial cells.

---

[1] In preparing the photomicrographs throughout a Zeiss D. objective has been used without correction. This has the advantage of giving sufficient magnification, without requiring great illumination, but at the expense of complete flatness of field.

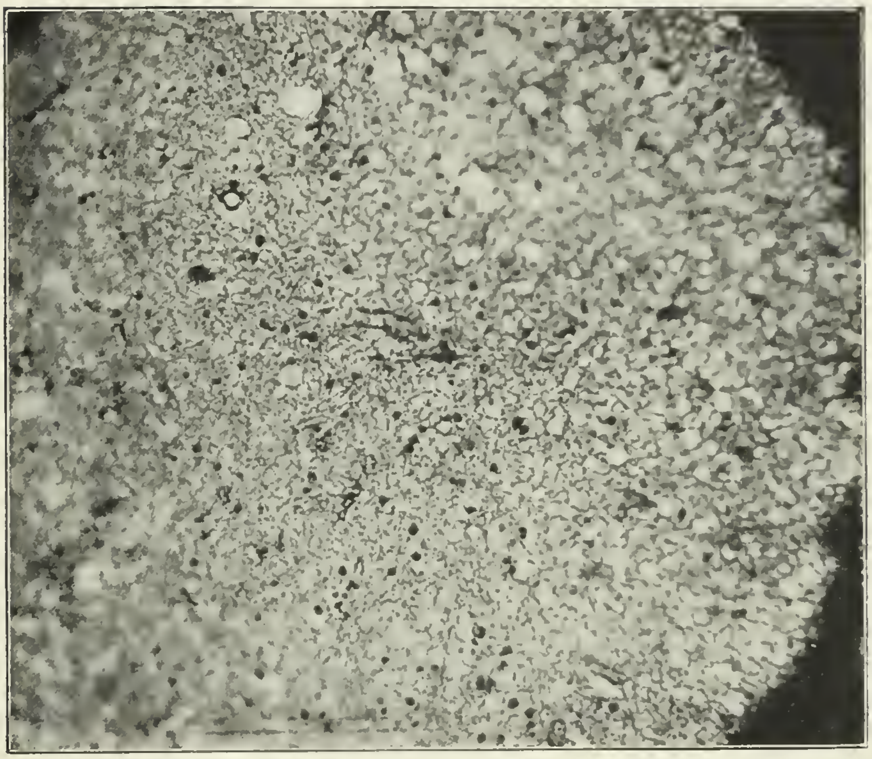


Fig. 2.

Case 2.—Quiescent glioma. Very few glia-nuclei. Some cyst formation. (Section not flat.)

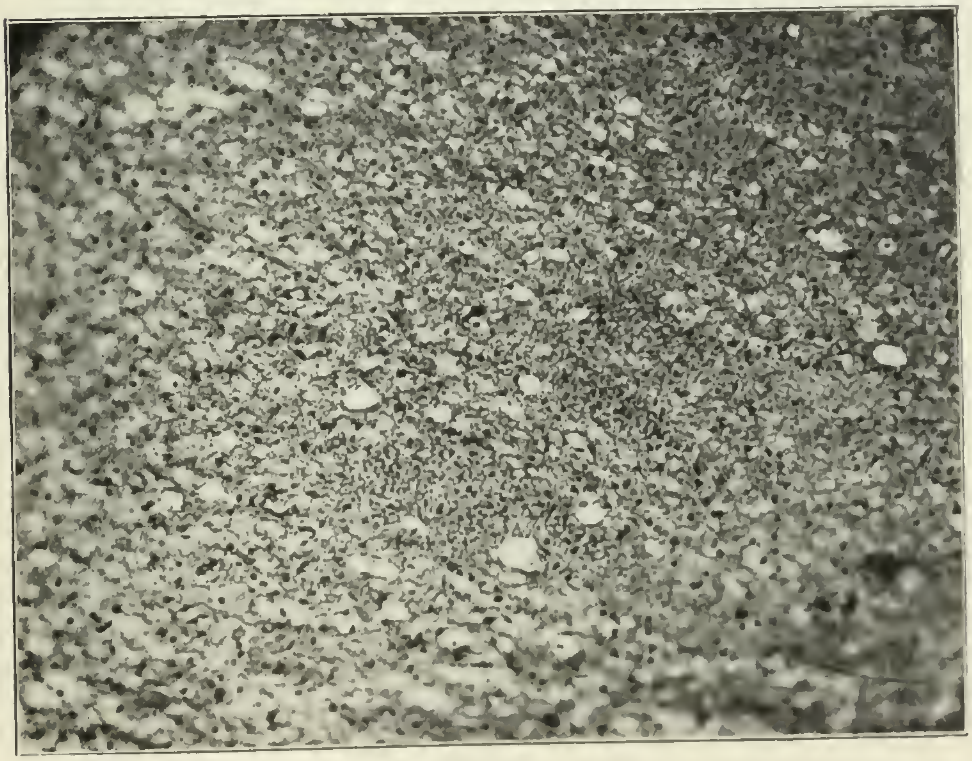


Fig. 3.

Case 2.—From another part of the same tumour as fig. 2. Hæmorrhages in the centre of the field.

These are the characteristic features of the simple (?) non-malignant phase of a glioma.

There is reason to suppose that a glioma may retain these apparently innocent characters for an indefinite period; in fact, the clinical history of many cases can be explained in no other way. It is conceivable that in such a phase the growth may be no more malignant than a lipoma. Moreover, rarely, it may be removed successfully without recurrence.

In confirmation of this statement is the following case:—

Case 2.—A girl, E. B., aged 19 (Dr. Bastian), admitted in 1904 with marked clinical evidence of cerebellar tumour. First symptom one and a half years before. Operation (Sir V. Horsley) disclosed a tumour the size of a hen's egg, occupying the left lobe, vermis, and part of the right lobe, which was removed. The patient is still alive, eight years after, and in excellent health. There is no bulging of the wound, so probably no tendency to recurrence. But owing, no doubt, to considerable permanent destruction of cerebellar tissue, she still presents many of the symptoms—ataxia and paresis of the legs—of a cerebellar lesion. She is so well that she is about to join her father in Canada.

Sections of the tumour removed (figs. 2 and 3) show a rather thickly felted stroma, so much so as to hide the glia-cells; small cavities are seen all over the section, indicating cyst formation so common in all gliomas. The glia-nuclei are relatively few, another suggestion of quiescence. Hæmorrhages may be seen, but possibly these may be due to operative manipulation.

Unfortunately this is a rare result, much too often the sequel is that of recurrence.

Now, assuming that there is such a thing as an innocent, latent, quiescent glioma, in what elements of the growth do the changes occur which constitute malignity, and what are those changes? The physiological process in action would appear to be that of active proliferation: this has its seat in: (1) The normal glia-nuclei of the stroma; (2) the glia-cells; (3) the blood-vessels.

(1) *The Nuclei.*—The number of these may be variable within limits which may justify our considering the appearance as of an innocent type. But one evidence that these nuclei may be sharing in the awakening of proliferative activity is their arrangement into circles or even lines, as has already been hinted in fig. 1. To what extent they share in the ultimate richly nucleated and cellular growth of the malignant glioma I am unable to say.

(3) *The Glia-cells.*—The evidence that the glia-cells play a most, if

not the most, important part in malignant activity seems to be quite clear. The alteration from the normal consists in: (*a*) Enlargement of the glia-cells; (*b*) increase in their number, though still retaining their morphological character, dendritic processes for instance; (*c*) multiplication of their nuclei; dislocation of these to the periphery of the swollen cell; (*d*) disappearance of the original cell, and independent existence of nuclei, which now resemble round sarcoma cells in a state of active multiplication.

This, I think, must be the sequence of events in many, if not all, of the malignant types. But it is possible that new cells, having some resemblance to altered glia-cells, may have a different origin, and the resulting growth may then more nearly resemble a true large-celled sarcoma. This is a difficult point, and it may be that the glia-nuclei may bear a larger share in this process than has been suggested above. It must not be forgotten that all these changes, in varying degree, may be seen going on in the same growth.

In illustration of the foregoing remarks are the following cases:—

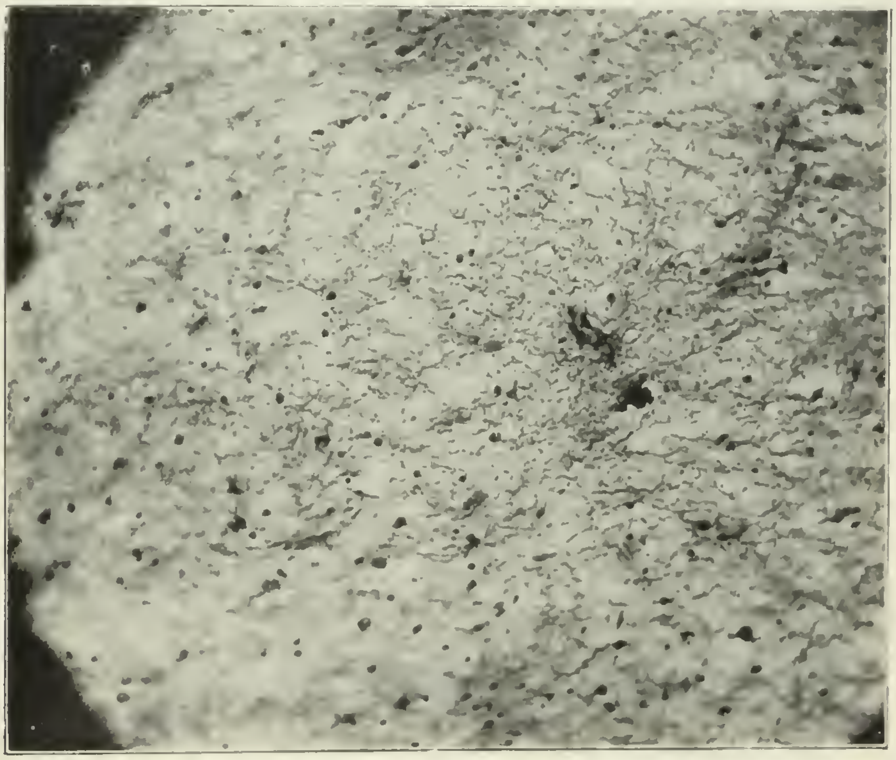


Fig. 4.

Case 3.—Glioma of innocent appearance. Glia-nuclei small and few. Glia cells difficult to see; one large one to right of centre.

Case 3.—A man, W. E. T., aged 50 (Dr. Buzzard); symptoms of ten months' duration. A fit followed by right hemiplegia and partial aphasia.

Operation (Sir V. Horsley), left central, discovered a large tumour subcortical, a cyst the size of a hen's egg was drained, and part of the wall excised, from which the section was taken. A considerable hernia resulted, and later sepsis showed itself. Five weeks after another operation was performed, but the notes are here defective. A febrile condition set in; he became quite aphasic, and died three months after admission.

Fig. 4 shows a simple, sparsely nucleated, somewhat cystic reticular stroma with only one doubtful glia-cell in the field. No evidence of active growth.

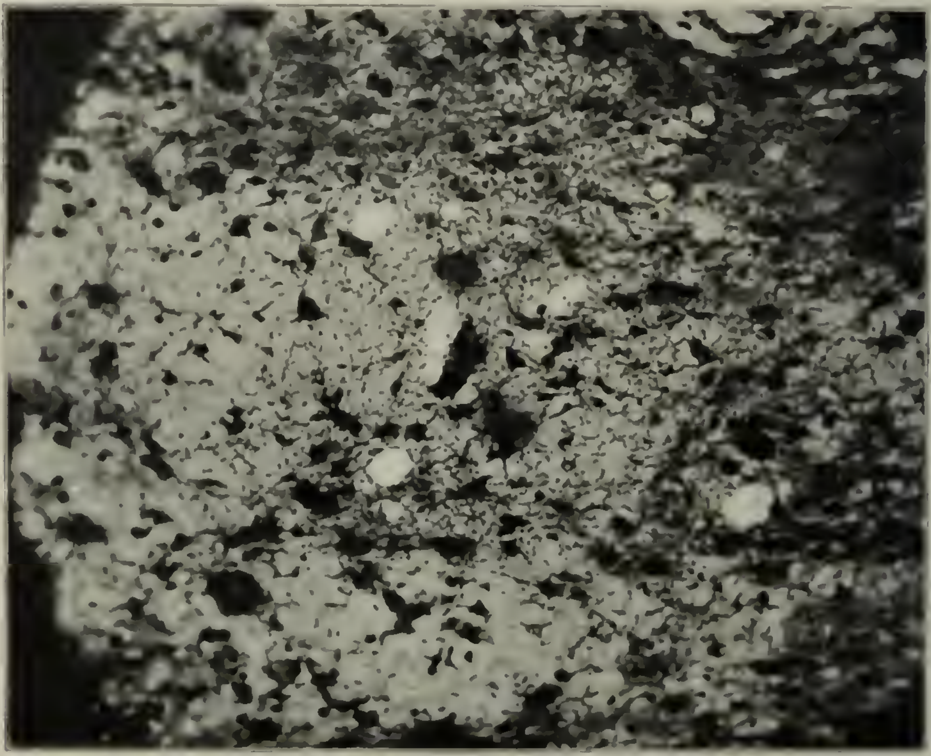


Fig. 5.

Case 3.—Evidence of activity. Glia-cells enlarging, their nuclei multiplying, shown in two cells in centre of field.

Fig. 5, the same stroma, but a considerable, not excessive, number of large glia-cells variable in size, some containing more than one nucleus. Glia-nuclei more abundant. General appearance of activity.

Fig. 6 from another part of the section; the stroma is more condensed, and glia-nuclei are in greater abundance than in the last two fields. The glia-cells are also here in some number, and of very variable size. Their proliferated nuclei are situated in rings round the periphery of the smaller cells; in places these rings are all that remain.

Case 4.—T. W. A., a man, aged 47 (Dr. Taylor); symptoms dated only fifteen weeks before admission; paraesthesia of the left arm and leg in attacks

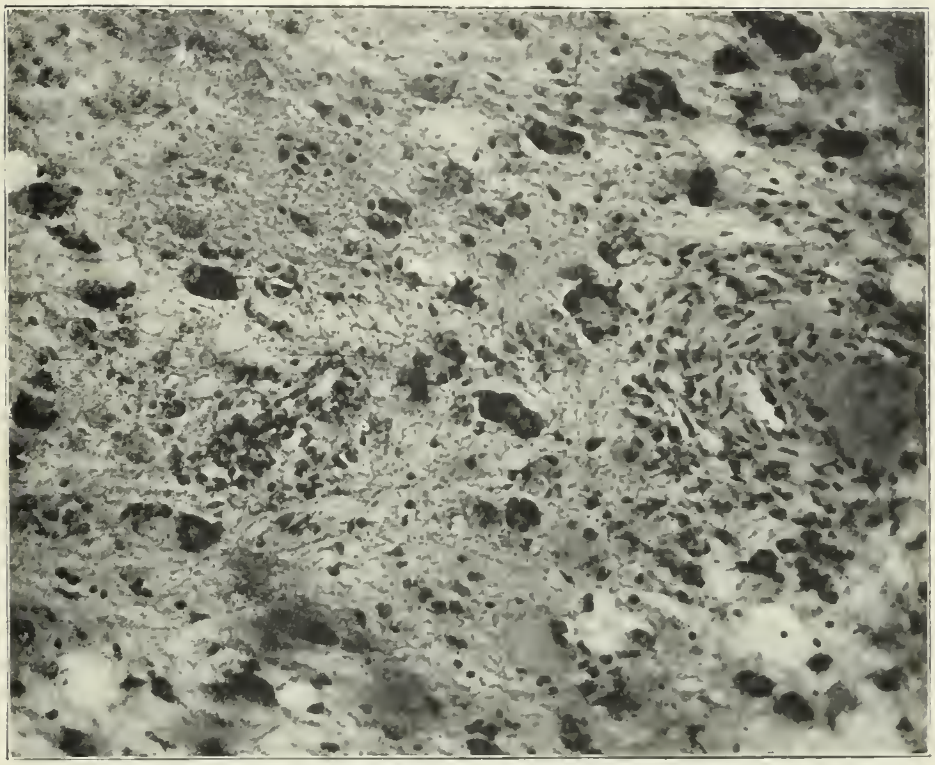


FIG. 6.

Case 3.—From a more-active part of the same glioma as figs. 4 and 5. Proliferation of nuclei of glia-cells, disappearance of cells, leaving rings of nuclei.

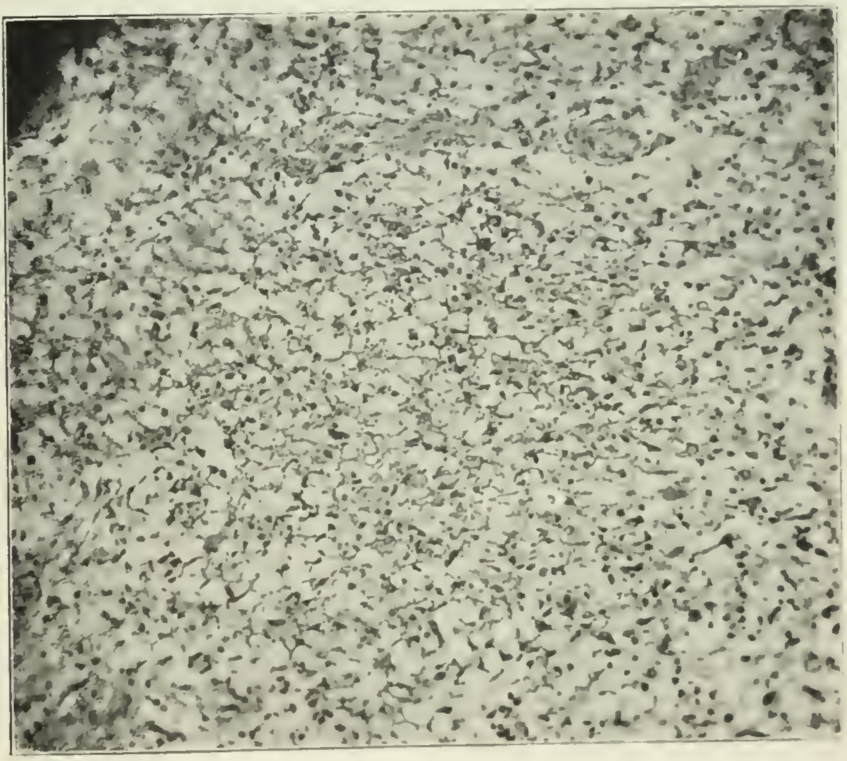


FIG. 7.

Case 4.—Glioma. Stroma finely reticular and cystic. Nuclei small, but in considerable numbers. Glia-cells of normal appearance and number.

of three months' duration. Left hemiparesis and anæsthesia on admission. Double optic neuritis and left hemianopsia. Operation (Sir V. Horsley) four days after admission. Right parieto-temporal not much bulging at first stage, but this was more evident at the second five days after. A large tumour subcortical to the right post-central region was found extending to the descending horn of the lateral ventricle, forward to the lower part of the precentral convolution, and back to the supra-marginal region. It was removed as far as possible. The patient made a fair recovery, but considerable bulging resulted, and there remained a left spastic hemiplegia. I hear from his wife that he died outside five and a half months after operation.

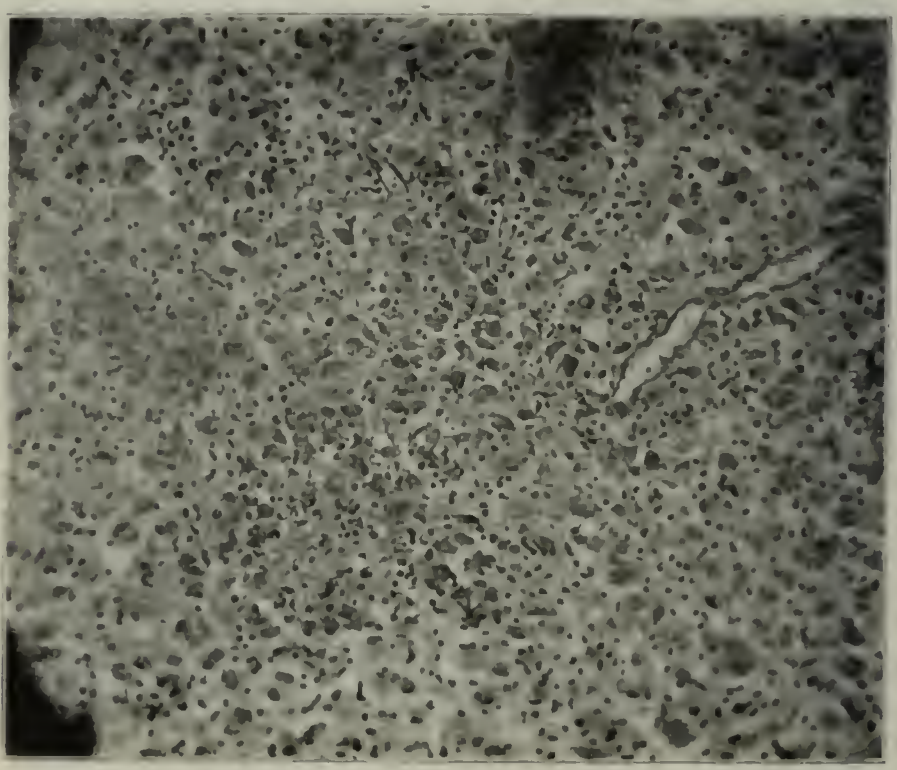


Fig. 8.

From same as fig. 7. Richly cellular, but glia-stroma retained. Cells mostly oval with a nucleus at one pole.

Fig. 7 shows a fine specimen of the simple type of glioma. The glia-nuclei are fairly abundant, but small, and with little evidence of proliferation. The stroma, however, has a cystic appearance, and the glia-cells are few and of normal character.

Fig. 8.—Here is a centre of activity, many definite cells of various size, some possessing glia-cell characteristics, others barely recognizable as such. Some with more than one nucleus, others with only one, but at one pole of the cell. I am doubtful of the true interpretation of this appearance, which is a common one. The cells are almost too small for

swollen glia-cells, they are mostly uni-nuclear. They may be swollen "glia-nuclei" and not glia-cells. Here and there the tendency to ring arrangement of nuclei is also to be seen in places.

Fig. 9.—In another part of the section is an area of necrotic degeneration, and in the neighbourhood of these areas one repeatedly finds thrombosed vessels; this will be referred to later.

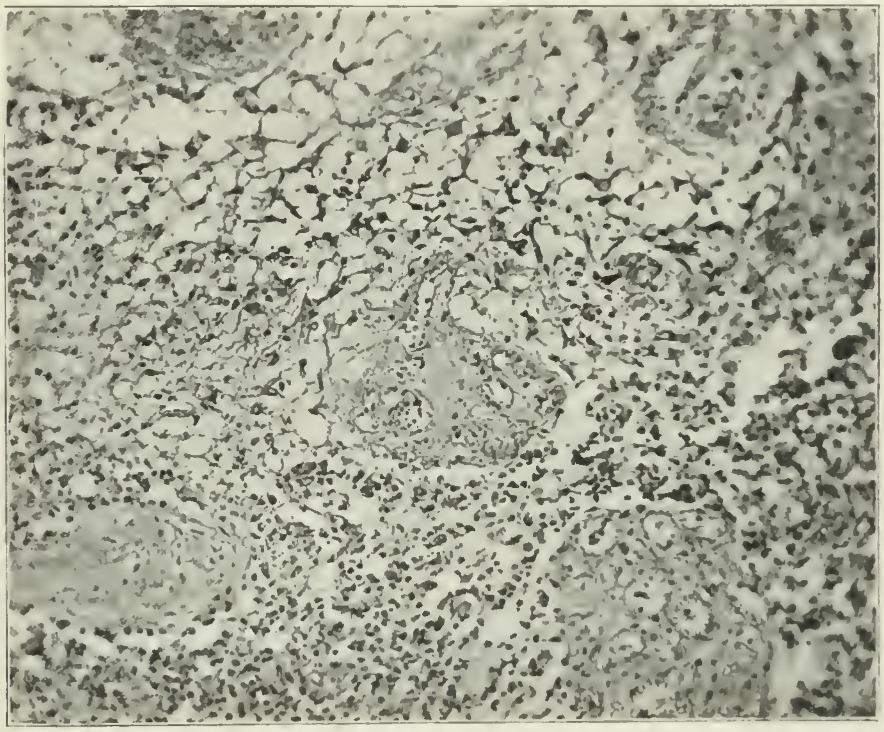


Fig. 9.

Case 4.—Vessels thrombosed, on the border of an area of necrosis. Lower half of section.

Case 5.—T. J., a man, aged 38 (Sir W. Gowers), was admitted in March, 1904, with a seven months' history of failing memory, fits, development of the dull, lethargic mental state of a frontal tumour, and intense double optic neuritis. A month after admission the right frontal region was explored (Sir V. Horsley), and a cystic tumour was found presenting as a small patch 1 in. in diameter in the middle of the right middle frontal convolution. On incision this proved to be the wall of a large cystic cavity; this was removed as much as possible, the area of removal reaching to the lateral ventricle. He made a good recovery, and left hospital, with some bulging of the wound, optic neuritis much subsided, and mental state natural, two months after. The hernia, mostly fluid, increased, and it was tapped with some relief three months after operation. The subsequent history of the case will be considered later under the head of "Recurrence."

Fig. 10.—A section of the tumour removed at the first operation. The glia-stroma presents no greatly abnormal appearance, it is somewhat condensed and cystic, and the glia-nuclei are not excessive in number. But what I take to be the glia-cells are in great numbers, large and swollen, yet with in many instances their dendritic processes retained. In some the nucleus seems to have disappeared, in others it is displaced to one pole of the cell, or in others there is more than one. This seems to me a more convincing illustration of the part played by the glia-cells than any I have yet shown. In some parts these cells have multiplied to the extent of obscuring all the other features of the original glioma.

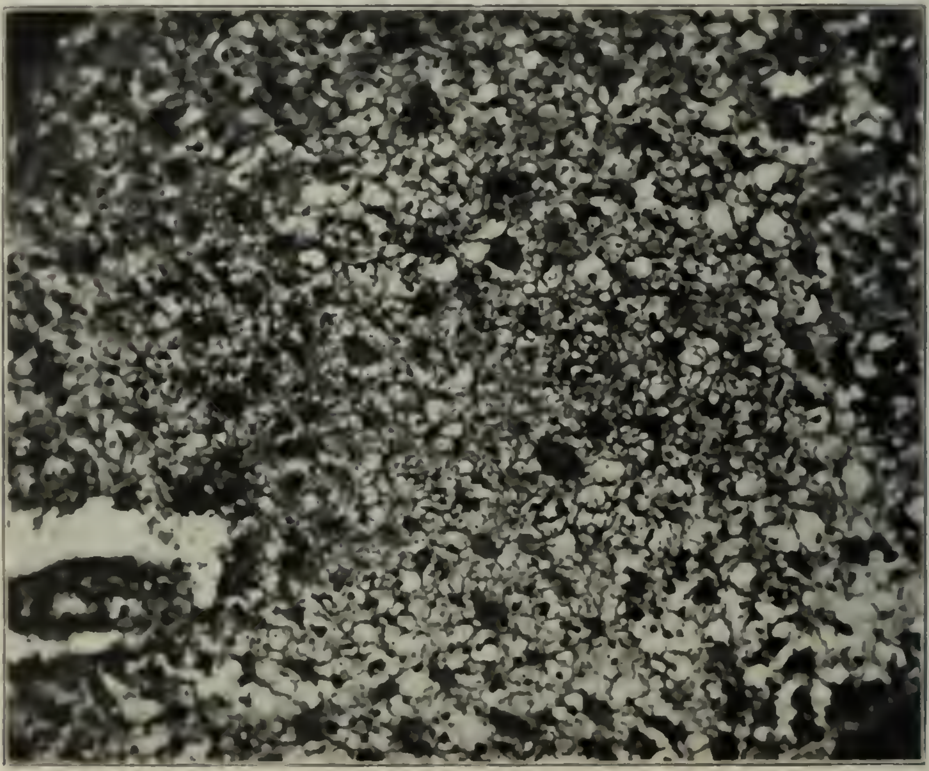


FIG. 10.

Case 5.—General glia-cell enlargement and multiplication, suggesting considerable malignant activity. The cells retain their processes, many are still uni-nuclear, or devoid of nuclei. The stroma is denser than in the last case, and cyst spaces are numerous.

The following is yet another instance. In spite of the very malignant appearance of the growth, this patient is still alive.

Case 6.—F. B., a man, aged 35 (Sir W. Gowers), admitted July, 1908, with a six months' history of failing memory, faints, headache, vomiting, diplopia, and failing vision. His mental state, defective memory, "dreamy states," were suggestive of a temporo-sphenoidal tumour, and two months after admission a large cystic tumour was removed (Mr. Armour) from the left temporo-sphenoidal lobe. After operation he was quite aphasic for a time, but this improved, so that four months after he could talk well and get about. But he remained emotionally unstable, and a large hernia cerebri developed. He was readmitted three years after operation with an enormous hernia. Mental condition vacant and stupid, memory and attention very poor. Right hemiplegia. Vision: right, blind; left, $\frac{3}{60}$. Optic disks: right, consecutive atrophy with + 4D. of swelling; left the same, but to a less degree. From the reply I have received I judge that he is in much the same condition, perhaps worse, than when last seen.

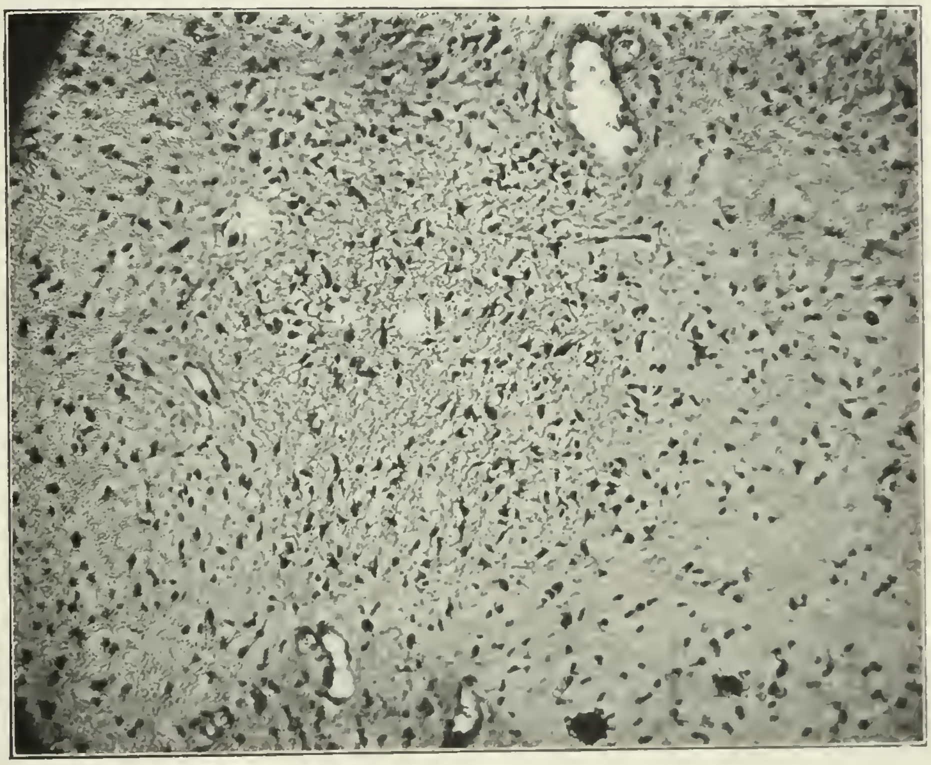


FIG. 11.

Case 6.—Glioma. Stroma rather dense. Nuclei present a shrunken angular appearance. No marked evidence of activity.

Fig. 11.—All parts of the growth show some evidences of its gliomatous nature, and this part has almost an innocent appearance, but the glia-nuclei, if such they are, present an unusually angular appearance.

Fig. 12 shows a great multiplication of glia-cells, less convincingly glia-cells perhaps than in the last case, but still retaining in many of them the multipolar form, and more closely packed. Multinucleation is also well shown. But some of the cells are oval and uni-nuclear, as in fig. 8.

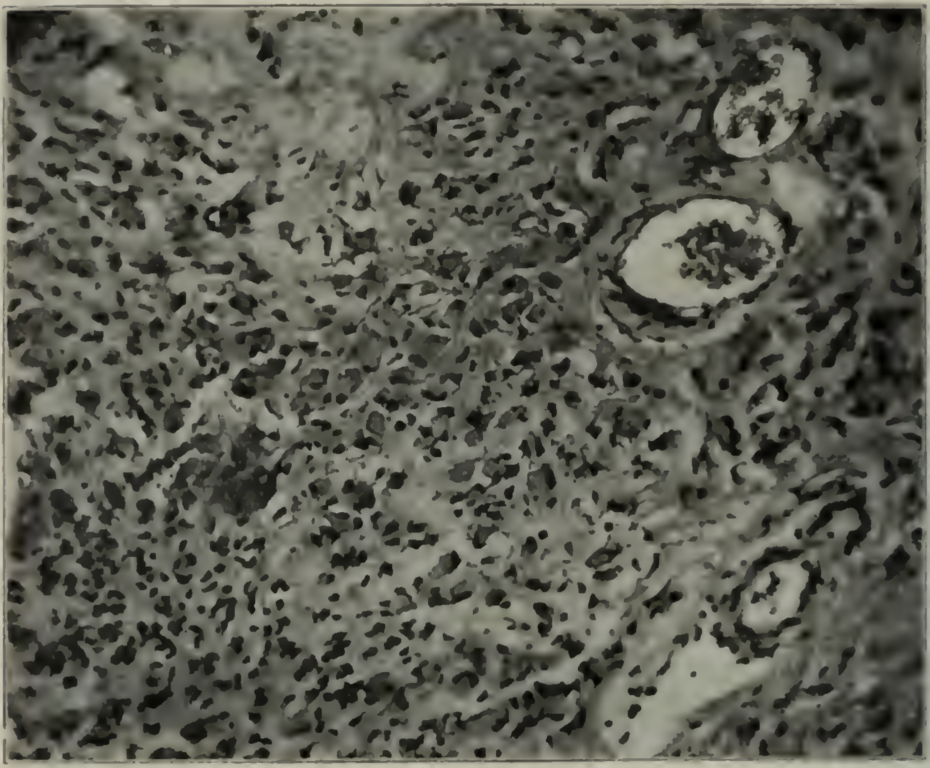


Fig. 12.

Case 6.—From an active part of the growth. Many swollen multinucleated glia-cells. Some oval with single nuclei, as in fig. 8.

Fig. 13 shows the same characters considerably enlarged.

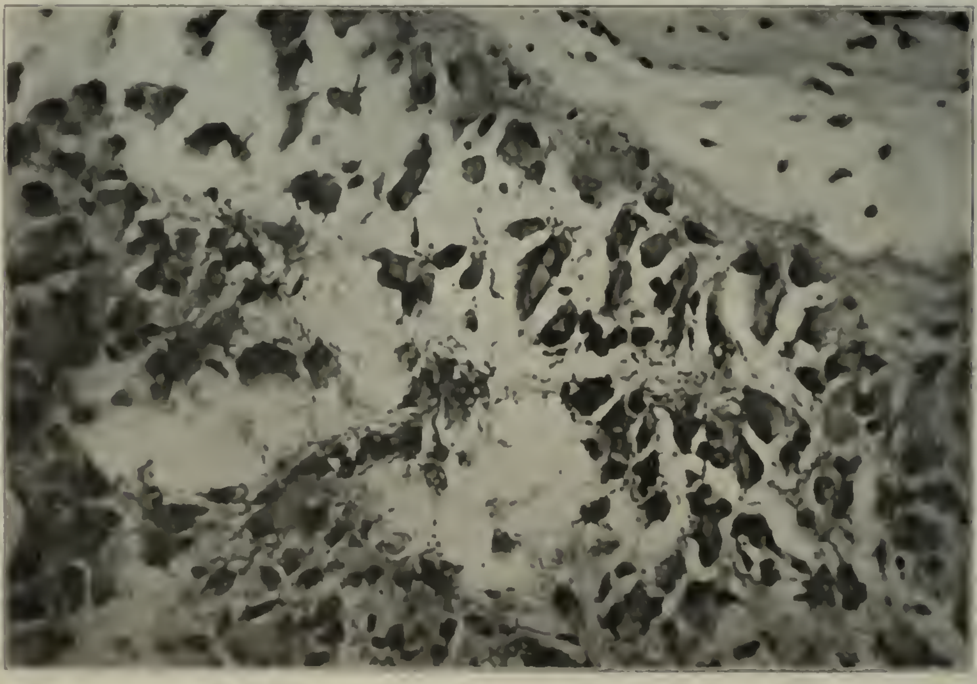


Fig. 13.

Case 6.—The same appearances as in fig. 12 enlarged.

Case 7.—H. C., man, aged 31 (Sir W. Gowers). The first symptom, sudden failure of vision and memory, dates only six months before death. He presented the typical mental state of a frontal growth, disorientation in time and space, jocular mania (Witzelsucht), anosmia, double optic neuritis passing to atrophy, with great amblyopia. An operation was arranged for, but he died the day before, eight days after admission. This is one of the most rapid cases. Post mortem was found a tumour involving the median and orbital surface of the left frontal lobe extending into the right.

Fig. 14.—The field is packed with large cells of varying sizes, and containing one to six nuclei, generally peripherally disposed. The cells contain a faintly staining granular cytoplasm and some are angular, but the original glia-stroma is very little in evidence. The annular arrangement of the escaped nuclei is well seen and within their circles may be seen the remains of the parent cell. This picture I regard as the extreme result of glia-cell proliferation. If not viewed by the light of the preceding cases it might well be regarded as a large cell sarcoma.

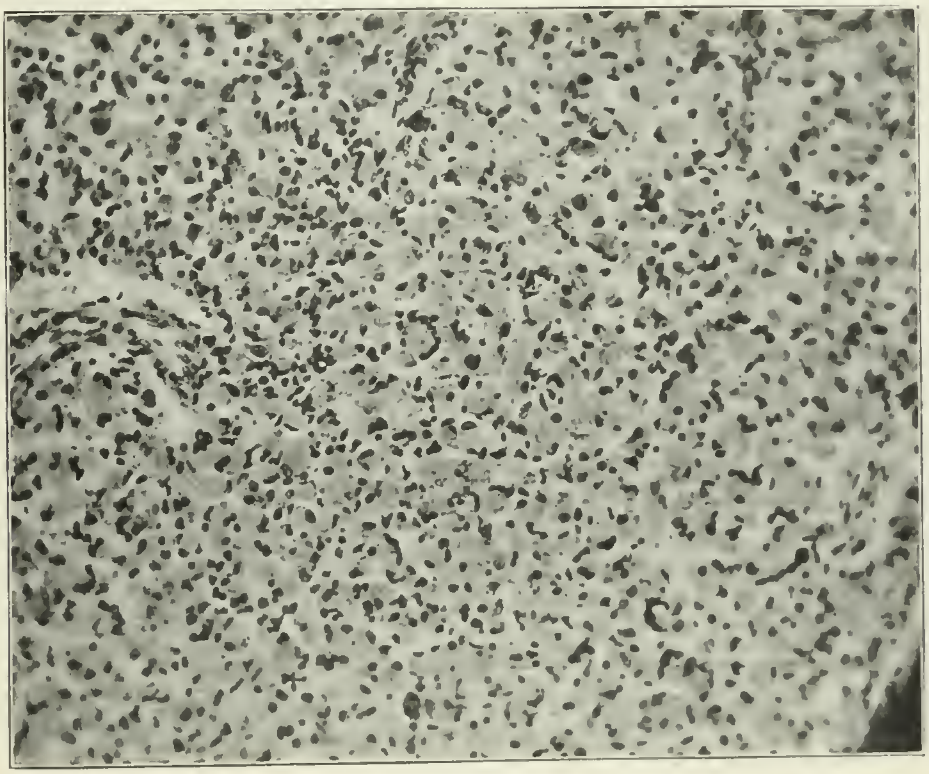


Fig. 14.

Case 7.—Closely packed large cells; cytoplasm faintly stained; multinucleated; nuclei peripherally disposed. Disappearance of parent cell, leaving a ring of nuclei.

Gliomas are not commonly multiple, and metastasis is practically non-existent. The following is a case of two tumours, one of which was a glioma and the other probably an angio-sarcoma.

Case 8.—W. E. G., aged 51 (Dr. Taylor). Another very rapid case, five months from first symptoms to death. He gave a history of left hemianopsia and rapidly failing vision to complete blindness. He was in hospital under a month, during which he became more and more stuporose and died. Post mortem a large tumour was found occupying most of the right occipital and temporal lobes, and another small one was in the right marginal gyrus, about 1 in. in diameter, hard and deeply congested.

Fig. 15 from the large occipital tumour is obviously a glioma. In spite of the rapid history this section shows little evidence of great activity. Probably sections from other parts of the growth would discover appearances of malignancy similar to those in the preceding cases.

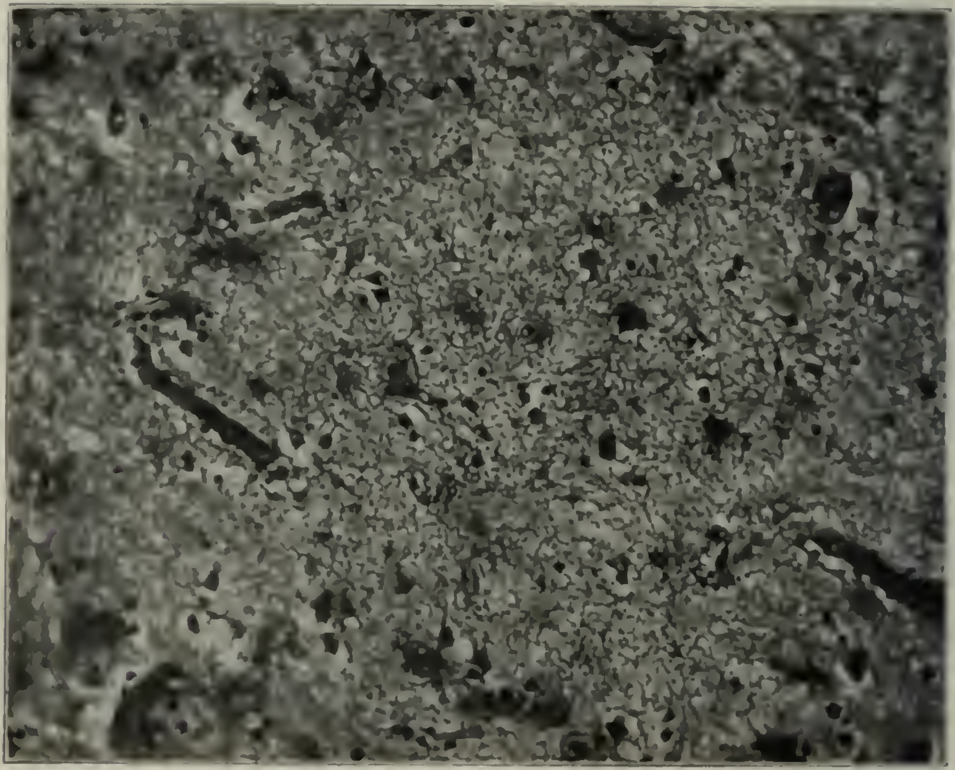


FIG. 15.

Case 8.—Occipital glioma. A densely reticulated stroma with large and not very many glia-cells; a few glia-nuclei.

Fig. 16 is a spindle-celled growth with many vessels, an angiosarcoma.

I do not suggest any pathological connexion between the two growths, but the case is interesting from its comparative rarity.

The next stage in this moving picture of proliferative growth that demands attention is that concerned in the further progress of the nuclei liberated by the disappearance of the parent glioma-cells, by which an appearance is produced different from that hitherto described in this account.

Malignant activity is plain enough in some of the sections figured above, but to my mind it is still more so in the stage to which we have now arrived; in fact, the histological picture is that of forces suddenly brought to a standstill when in full play. In illustration of this—

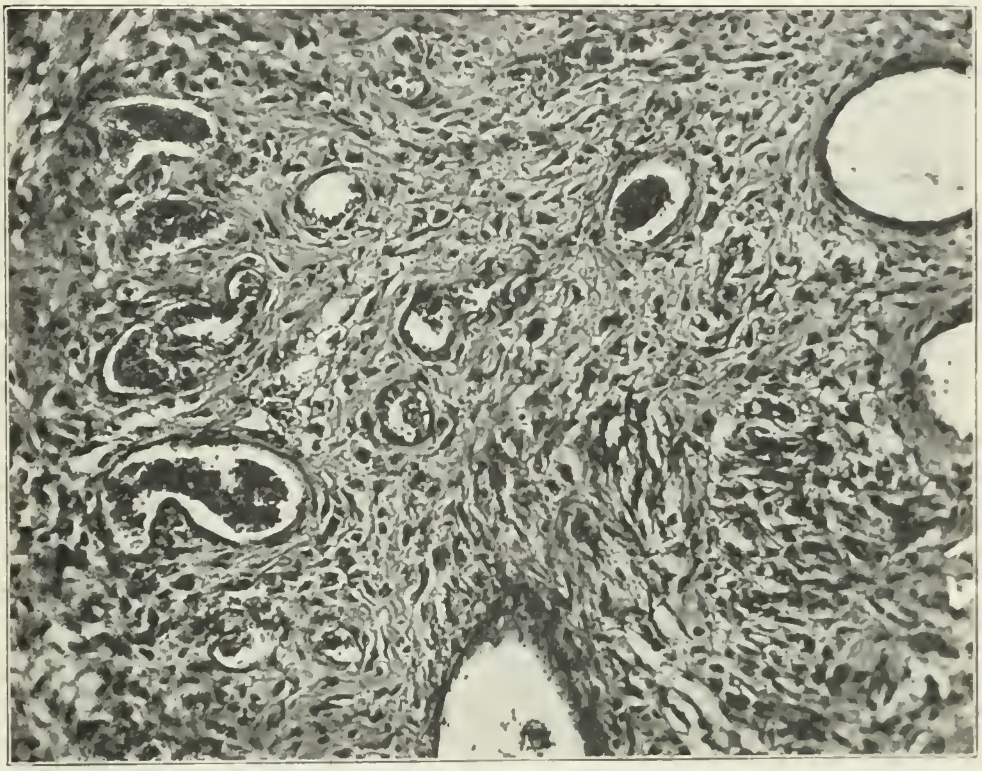


Fig. 16.

Case 8.—Second small, hard, vascular tumour in straight marginal gyrus; an angio-sarcoma.

Case 9.—A. M., aged 37 (Dr. Beevor), admitted July 1, 1904, with a long history, two years, of fits, no details given; ten months, visual symptoms suggesting left hemianopsia, which was confirmed on admission; four months, fits beginning in the left foot. No hemiplegia, no optic neuritis. Readmitted in December, 1904, seven months after; two months after this optic neuritis appeared, a post-central growth was diagnosed, and operation followed (Sir V. Horsley), February, 1905. A large cystic tumour, cyst within cyst, was shelled out. The patient made a good recovery and was discharged as "cured." He was readmitted in June, 1906, four months after operation, with progressive left hemiplegia and hemianæsthesia, but the optic disks were clear and showed no evidence of past neuritis. I heard from his widow that he died in September, 1906—i.e., nineteen months after operation.

Section of the growth, which includes a piece of cortex, under which the growth, fig. 17, lies. This is a cellular glioma, rich in large swollen cells, but with their processes yet retained, and some of the glia-stroma reticulum between, also rings of nuclei, many of small diameter, showing within their circumference the remains of the parent cell.

Farther away from the cortex the large cells are in still greater abundance, packed closely and also crowded with nuclei round about them.

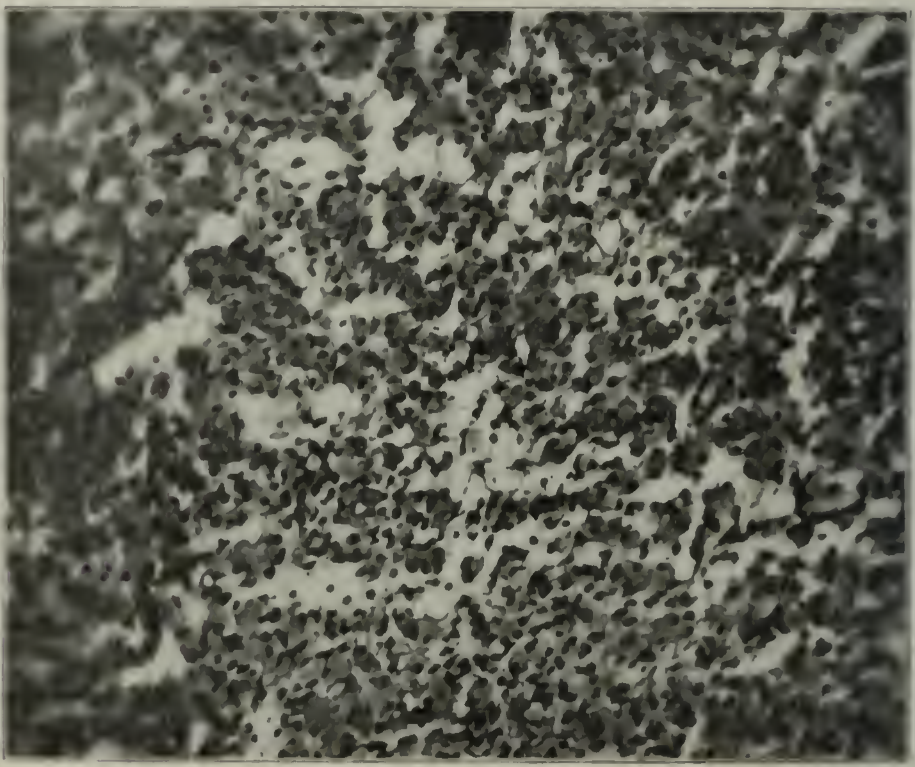


Fig. 17.

Case 9.—Richly cellular and nuclear glioma. Of the large cells many are multinuclear, and many are disappearing, leaving a ring of nuclei.

Fig. 18.—Farther still we find the nuclear elements in such numbers as to obscure the parent cells or their remains, though by careful focusing many may be seen. The picture now is that of a small round-celled sarcoma, but by no effort of focusing can one see any cytoplasm surrounding these nuclei. Possibly recent special stains may show that these are the nuclei of new cells, but I have not yet had the opportunity of seeing the result of their use.

The arrangement of these nuclear elements of the growth is also characteristic; in all parts of the field are circles or half-circles, rarely straight lines, presumably in whatever plane the section is made. The circles may be small, no larger than the circumference of the parent cells from which they come, but they show a tendency to an ever widening radius, suggesting lateral division of neighbouring nuclei. The semicircles of course suggest a slight tilting of the plane of that circle, so that half is in one section and the other half in the next above or below. So frequent are the rings in any given plane that one is tempted to conclude that every nucleus all over the field is one of a little circle of its own in another plane. This annulation, as representing independent centres of growth infinite in number, bring home to the mind of the observer the intensity of the exuberant activity that constitutes high malignancy. No doubt this annulation has been seen often enough by other observers, for it can be seen in all these richly cellular growths.

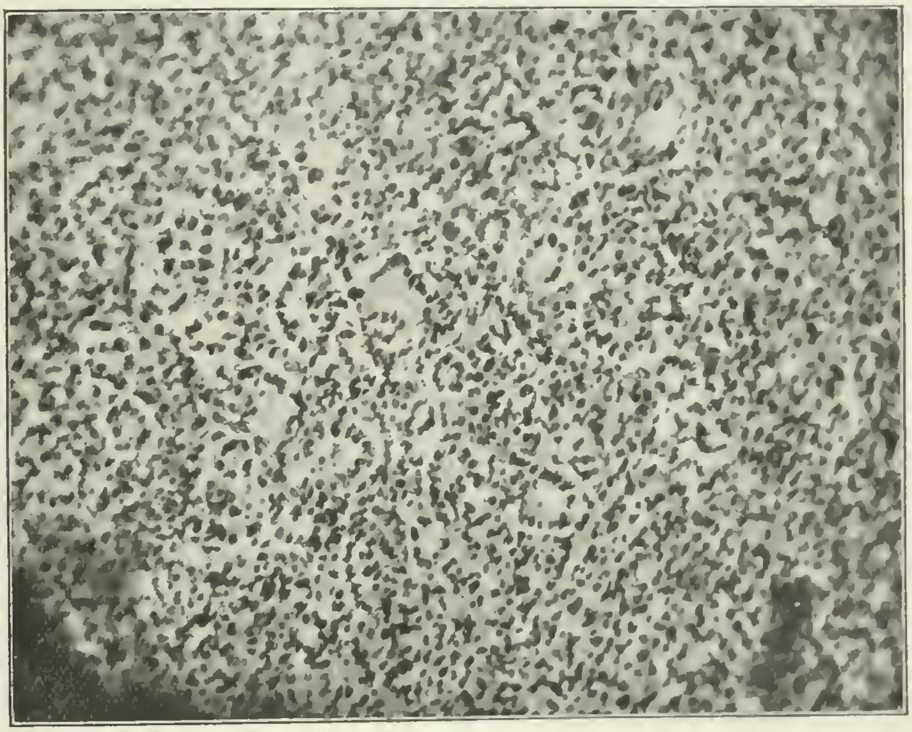


FIG. 18.

Case 9.—Illustrating ring formation, or annulation. In a thick section underlying features tend to confuse a photograph; therefore in this figure some of the details immediately adjacent to the most obvious rings or semicircles have been blocked out.

Annulation has been demonstated as occurring in a greater or less degree in many of the preceding figures. In fig. 1 even, it is seen, and in this also can be seen the tendency to formation of straight lines, which may be a common arrangement, but it would naturally be less evident in a crowded picture. A similar grouping of nuclei may be seen in the growing brain (see the article on the "Cyto-architecture of the Cerebral Cortex," by Drs. Bolton and Moyes, *Brain*, 1912, xxxv, part 1, p. 14, fig. 7).

From the foregoing observations one seems to be justified in conceiving an ascending scale of malignity from the slow-growing or quiescent overgrowth of glia-tissue to an anatomical picture resembling grossly malignant sarcoma. These may be, and are, called glia-sarcoma, but I have avoided using the word; it seems unnecessary and perhaps misleading to have another word for what would appear to be a phase of growth only, if that is the right reading of these changes.

Recurrence.—In several cases an opportunity has been afforded of examining the growth removed by operation and subsequently the recurrent growth at a second operation, or post mortem. The two cases following are the simplest, the others present such complicated appearances and would require so many photographs to bring out all their features that I have thought it wiser to omit them.

Case 5.—Sequel, *vide supra*, p. 28. Three months after removal of a large cystic frontal tumour a large resulting hernia was tapped with some relief. The histological appearances of the growth removed at operation are shown in fig. 10. He was readmitted five months after operation and stated that he had been practically well until six weeks before, since when he had had two to four fits a week and he became mentally dull and lethargic. He was in hospital for a month, and left much improved mentally but with a large fluid hernia as before. During stay in hospital he had one general convulsion. He was readmitted for the third time nine months after operation with a progressive left hemiplegia and much mental dullness and apathy. His condition not improving, the flap was reopened nine days after admission and a large quantity of clear fluid was found in a cavity, the site of the original tumour. At the bottom of this cavity a mass of growth was seen and removed. He did not recover consciousness and died the next day, the temperature rising to 104·8° F.

Fig. 19 shows very similar appearances to those of the last case, fig. 18. No glia-cells can be seen at all. Annulation is quite distinct and there is no superficial resemblance to the original growth. It shows every appearance of rapid recurrence and would no doubt eventually have filled the cavity left by the old tumour.

Case 10.—This is a more doubtful illustration of recurrence than the last, because the time which elapsed between the removal of the growth and the post mortem is so short, eleven days only. But the time element in pathological events is always an almost unknown factor.

W. O., a man, aged 42 (Dr. Batten), admitted November 4, 1910, with an eighteen months' history of frontal headache and frequent faints, eight months failing vision and memory, and slight sphincter weakness. He showed some of the mental symptoms of frontal tumour, which became more marked later, and intense optic neuritis and swelling, rather more pronounced on the right side.

Twenty-five days after admission the right frontal region was explored by

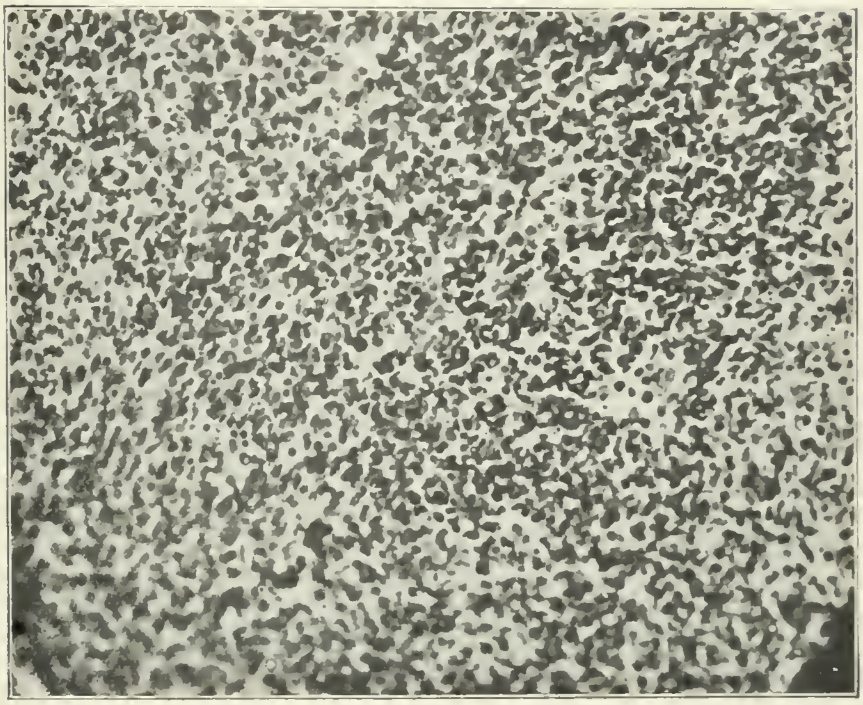


FIG. 19.

Case 5.—Section of mass of recurrent growth, resembling closely fig. 18. Annulation is obvious, also a tendency to arrangement in lines more or less straight.

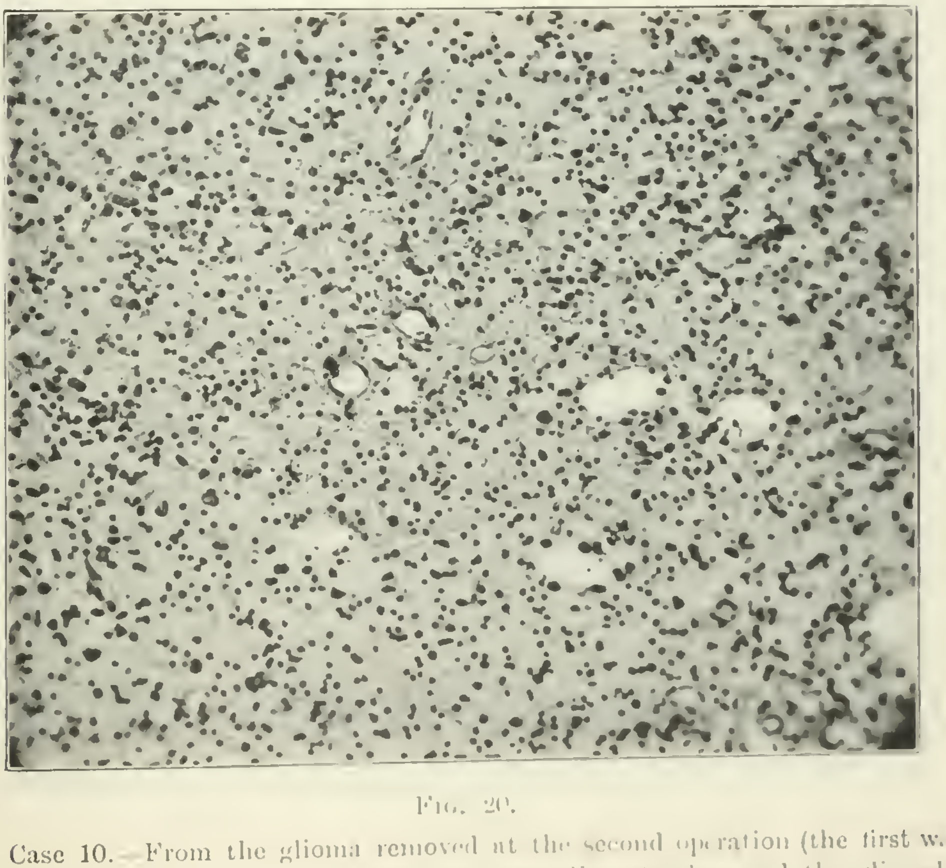


FIG. 20.

Case 10.—From the glioma removed at the second operation (the first was exploratory). The stroma is finely and normally reticular, and the glia-cells few and almost invisible. But the nuclei are in great number, and annulation well shown all over the field. Two normal vessels are seen on each side of an annulus, to the left of the centre.

incision (Sir V. Horsley); the substance was thought to be abnormally firm and nothing was done. The patient made a good recovery and the neuritis subsided rapidly. He was discharged to the Convalescent Home, but was readmitted four months after operation, with headache again, mentally emotional and slow cerebration. There was an increasing hernia, and a renewal of the optic disk swelling. Another operation was then performed. On exposing the frontal lobe a large cyst burst, which was partly removed. There was no relief this time, the temperature fluctuated between 100° and 104° F., and patient died eleven days after. At the autopsy the main tumour was found in the mesial side of the right frontal lobe extending over to the same side of the left frontal and forward to within 1 cm. of the frontal pole and back to the anterior horn of the lateral ventricle, involving the genu of the corpus callosum, from which it may have originated.

Fig. 20.—A section of the tumour removed eleven days before death is a fine example of a glioma in which the glia-cells seem to be little affected. The reticular stroma also is fairly normal and also the vessels. But the field is richly nucleated and annulation is evident. The nuclei are variable in size and in places still more numerous than in this figure. This is a good example in illustration of a probable share taken in proliferation by the simple glia-nuclei.

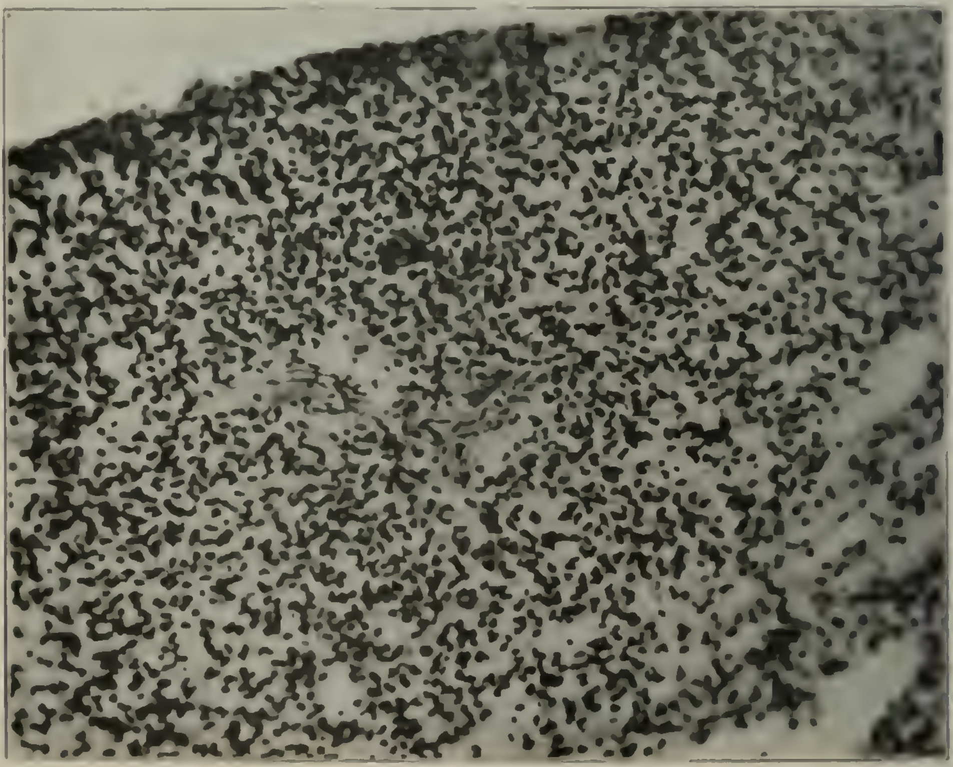


Fig. 21.

Case 10.—Recurrence. From the growth removed (post mortem) eleven days after the second operation. The appearances are almost exactly similar to those of fig. 19.

Fig. 21.—A section of the growth removed post mortem. Unfortunately most of the section is of altered brain substance, but there is one portion of it sharply delimited, and evidently growth which resembles in every respect the recurrent growth of the last case; little if any glia-stroma is to be seen, but somewhat irregular annulation is visible all over the field.

If these appearances are to be accepted, and I offer them with the greatest possible diffidence, one is forced to infer, on pathological grounds alone, that surgical interference, exploration, or manipulation, with few notable exceptions, is at any rate liable to awake into greater activity a tendency to exuberance which perhaps may be almost latent at the time.

The Rôle of the Blood-vessels.

What part do the blood-vessels play in the growth and progress of the glioma?

In vascularity these growths show wide variations, from one or two small thin-walled vessels to the field, of which the endothelial lining is marked by a few nuclei at regular intervals, to the development of numbers resembling an angioma.

The larger vessels should present the natural appearance of an arteriole, but sometimes one finds, especially in the more angiomatous forms, a thickening and condensation of the glia-tissue round about the large vessels as in fig. 22, belonging to Case 8, in which the second tumour was an angio-sarcoma.

But in many cases the small vessels show a marked swelling and proliferation of the endothelial intima. Fig. 23 is from another case of recurrence after removal. The recurrent growth was more vascular than in the cases above mentioned, and the stroma presents a fibro-sarcomatous appearance, which was absent in the original growth. This section illustrates the swelling and proliferation of the endothelial intima. The vessel may remain pervious, but if the process continues the ultimate result is complete blocking of the lumen and a picture that is almost unrecognizable as a vessel at all may result.

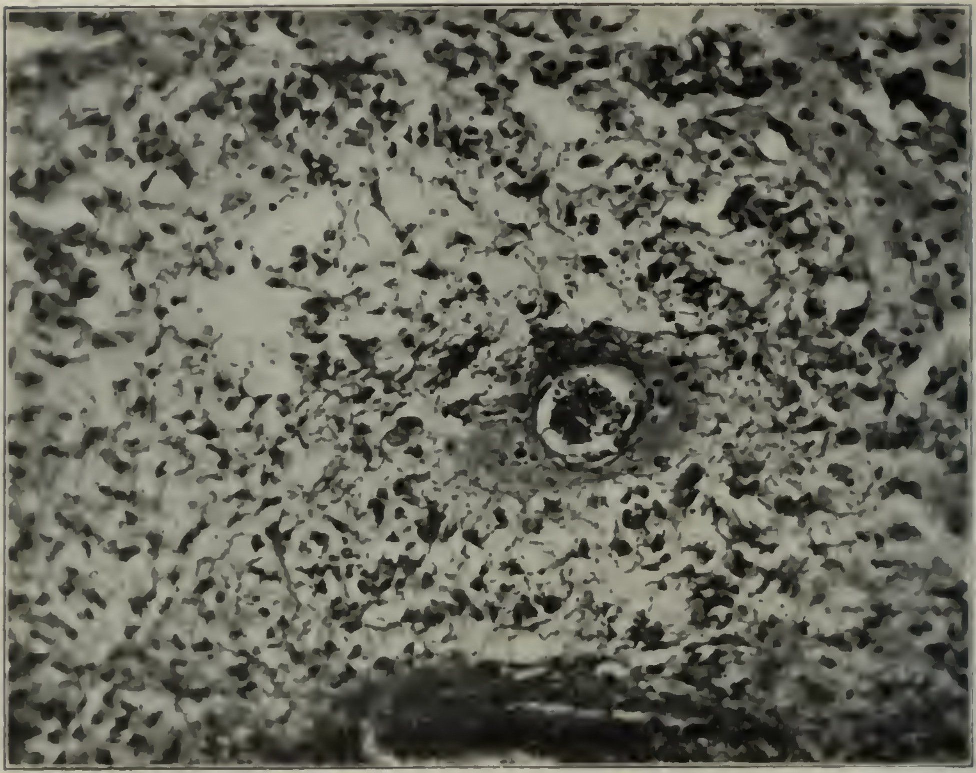


Fig. 22.

Case 8.—Detail from the smaller tumour, of which fig. 16 gives the general characteristics of angio-sarcoma. A vessel surrounded by condensed, almost fibrous tissue. In this particular situation the stroma somewhat resembles that of coarse glioma, but it is exceptional, and probably a necrotic effect.

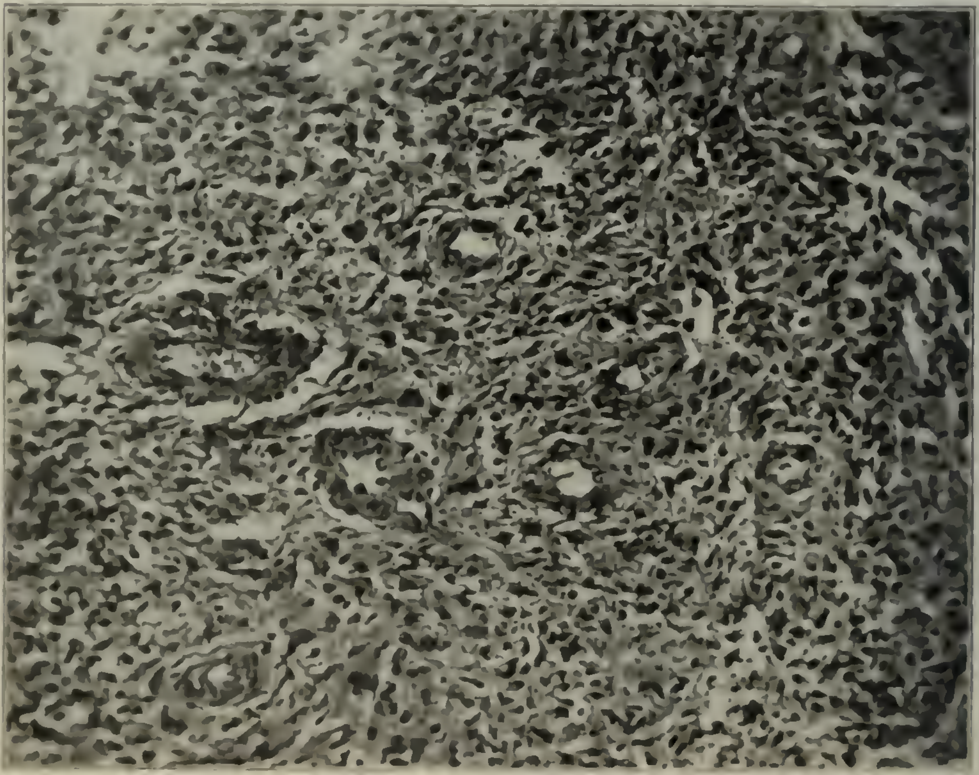


Fig. 23.

From the recurrent growth after removal of the original tumour from the post-central area. The small vessels show swelling and proliferation of the intimal endothelium, but many are still pervious.

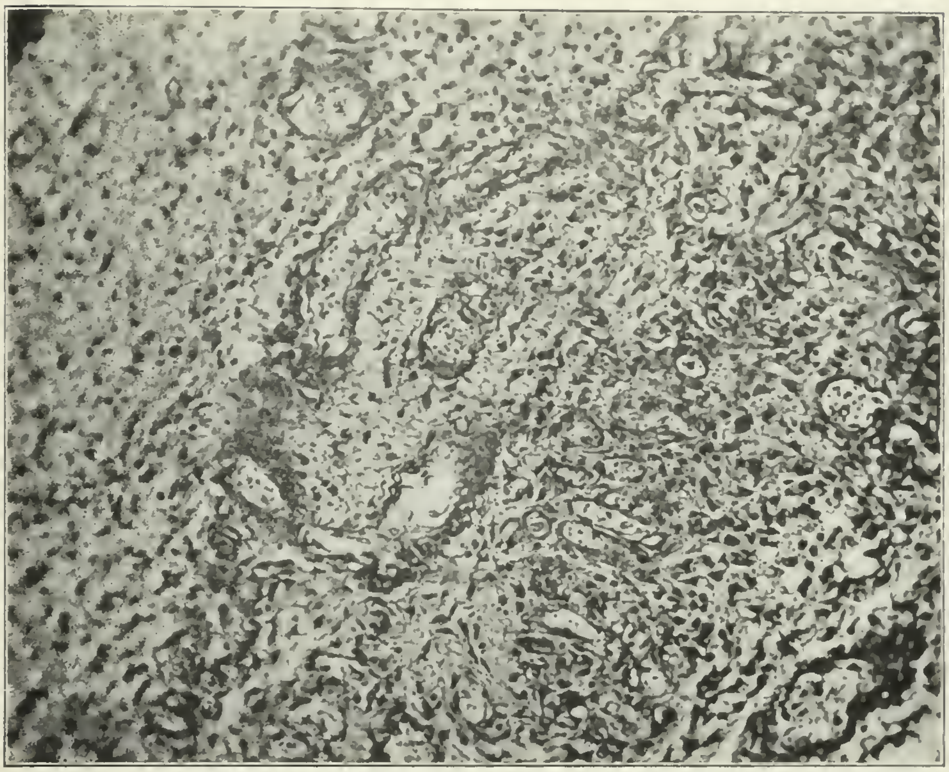


FIG. 24.

Case 11.—From a large glioma of the centrum ovale. Great vascularity, but intimal proliferation is not shown in this section.

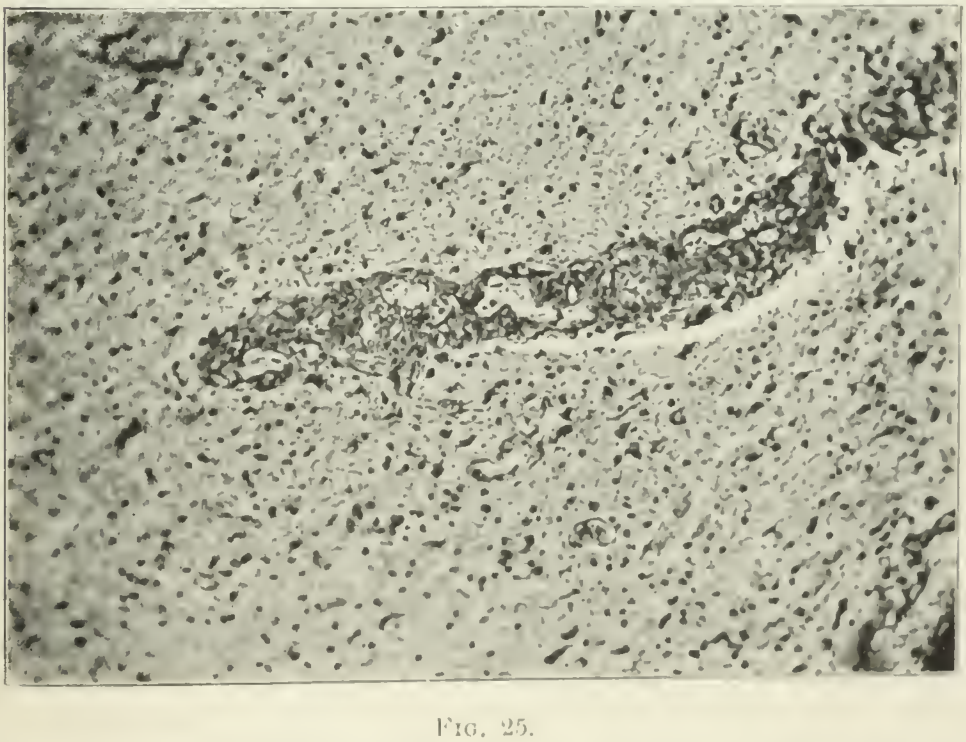


FIG. 25.

Case 11.—A longitudinal section of a vessel, showing an extreme effect of endothelial proliferation.

Case 11.—H. B. (Dr. Tooth), a large glioma of the right centrum ovale. The patient died seven years after the first symptom.

In places (fig. 24) the angioma formation only is seen. In others the intimal proliferation is very striking (fig. 25). A similar instance is taken from Case 6 (fig. 26).

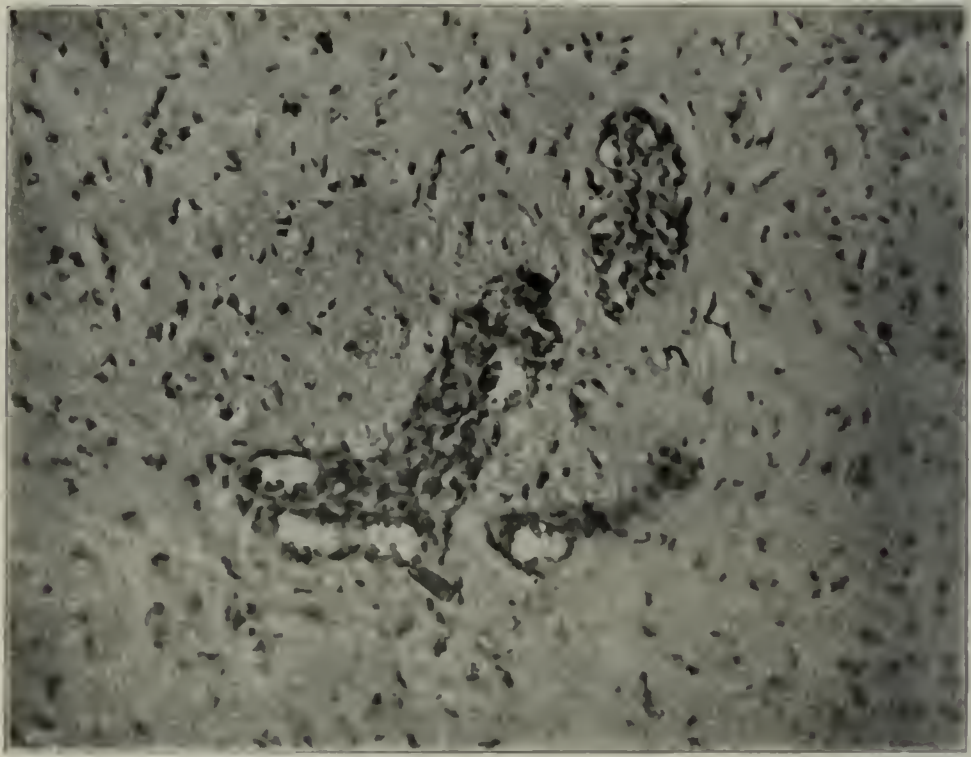


FIG. 26.

Case 6 (*vide supra*).—A longitudinal and almost transverse section of (?) the same vessel. Showing complete obstruction of the lumen.

The following illustrates some of the features of vascular change very well.

Case 12.—W. H., a man, aged 47 (Dr. Jackson). Two months before admission he fell on the back of his head and immediately after his left leg became weak and this progressed. The connexion between the blow and the onset is so obvious that one must suppose that the tumour was in existence in a latent form and that traumatic influences either woke up malignant activity or caused a small hæmorrhage. However that may be, the case ran a rapid course from this time, and a left hemiplegia resulted with gross optic neuritis. Two months after the first symptoms he came to operation and the arm area was found involved in growth, a richly cellular glioma of ill-defined margin extending deeply to the lateral ventricle; as much as possible was removed. He made a good recovery, and all symptoms improved; hemiplegia less, and optic neuritis subsiding. He wrote four weeks after discharge that he was still improving, but I learn that he died later, ten months after the first symptom.

Fig. 27 shows an intensely richly nuclear part of the growth; annulation marks its activity. Tiny vessels can be seen ramifying in all directions. They are quite primitive, little more than channels with a thin limiting membrane and no endothelium can be seen.

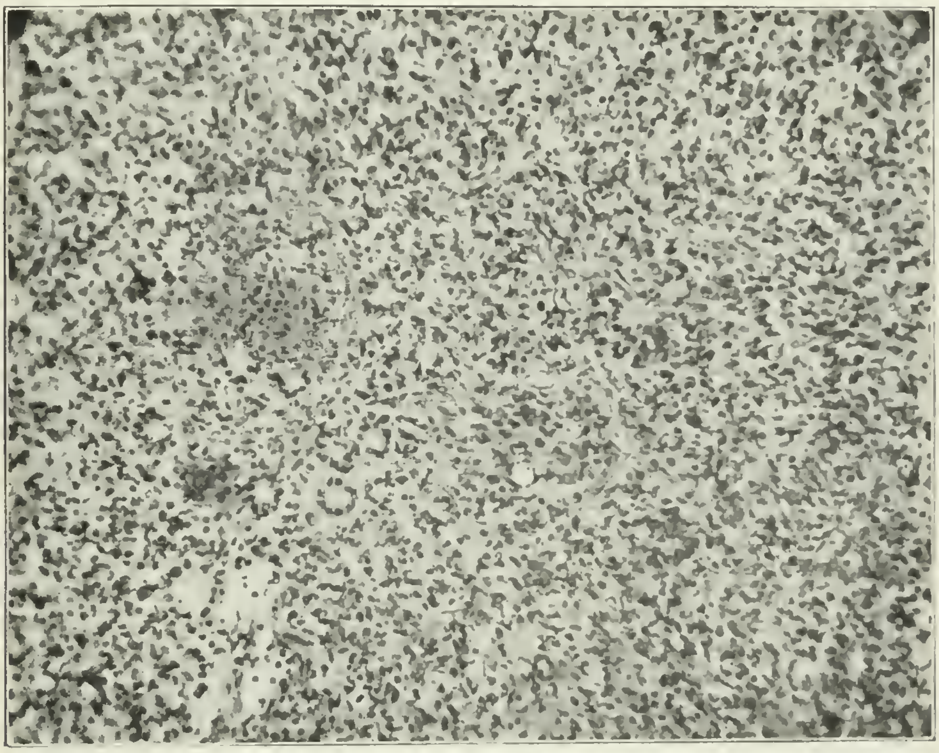


Fig. 27.

Case 12.—From a highly active part of the growth. Fine vascular channels can be seen with a glass in the right central part of the field.

Fig. 28.—On the border of an area of necrosis; the small vessels are in great plenty, as indeed they are everywhere in all the sections, and the intimal proliferation can be seen in all degrees from the single layer of swollen cells to complete blocking of the lumen. The photograph is wanting in distinctness on this point.

Fig. 29 shows two bunches of vessels somewhat like a renal glomerulus. Some of the constituent vessels are pervious, and many are blocked.

Fig. 30.—In a necrosed area, a large vessel in the centre of the field, pervious, and containing blood corpuscles. Its wall presents a meshed appearance, which may be due to necrosis of proliferated intima, very much resembling on a small scale the structureless meshwork of a cholesteatoma. A neighbouring vessel appears to be thrombosed, full of fibrinous fibrils.

Fig. 31.—A vessel on the border of a necrosed area, probably containing organized thrombus.

In some of these pictures it is difficult to say how much the appearance is due to intimal proliferation—because the endothelium tends to degenerate with the other elements of the growth—and how much is due to organized clot. Both may be present; probably the sequence of events is—blockage of the smaller vessels which have an endothelial lining, by the multiplication of the cells composing it, and a subsequent thrombosis backwards to the larger vessels, and so starvation of blood to an area of the tumour.

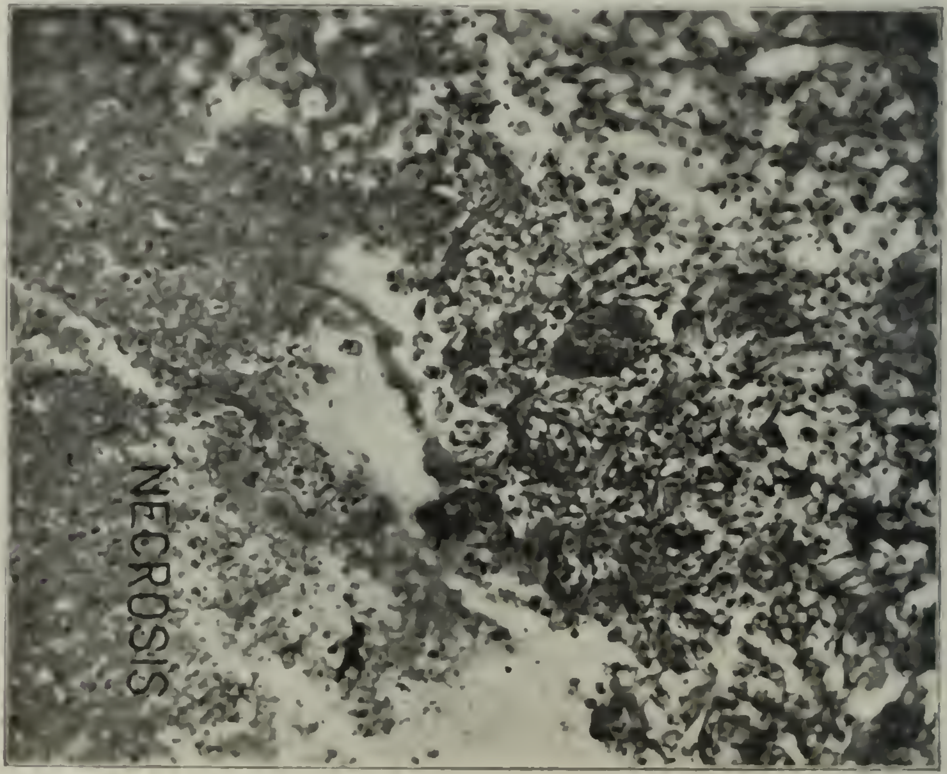


Fig. 28.

Case 12.—Vessels on the border of an area of necrosis (left half of section). The central right half of the field shows a group of small vessels the endothelium of which is proliferated; but the photograph fails to bring out their features owing to obtrusion of other nuclear details.

Necrosis.—This brings us to the last stage in the life-history of the glioma—necrosis, a process which is going on *pari passu* with vigorous vitality elsewhere in the growth. Moreover, it is not too much to say that the more evidence existing in a given tumour of active growth, the more certainly will be found parts in which necrosis is in progress. Fig. 32 is a good picture of such an area taken from another case. There is an appearance of the calm of death about it—dissolution rather. The last remaining nuclei have still some chromatin, but it is fast disappearing; so they present a shrunken appearance very

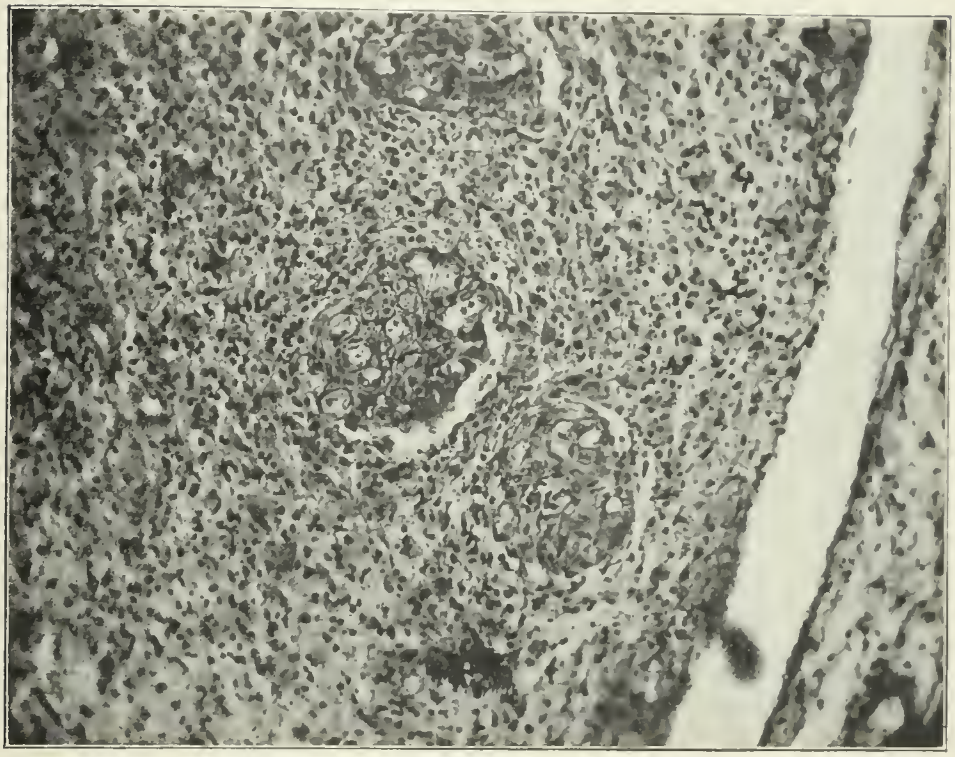


FIG. 29.

Case 12.—Glomerular multiplication of vessels on the border of an area of necrosis.

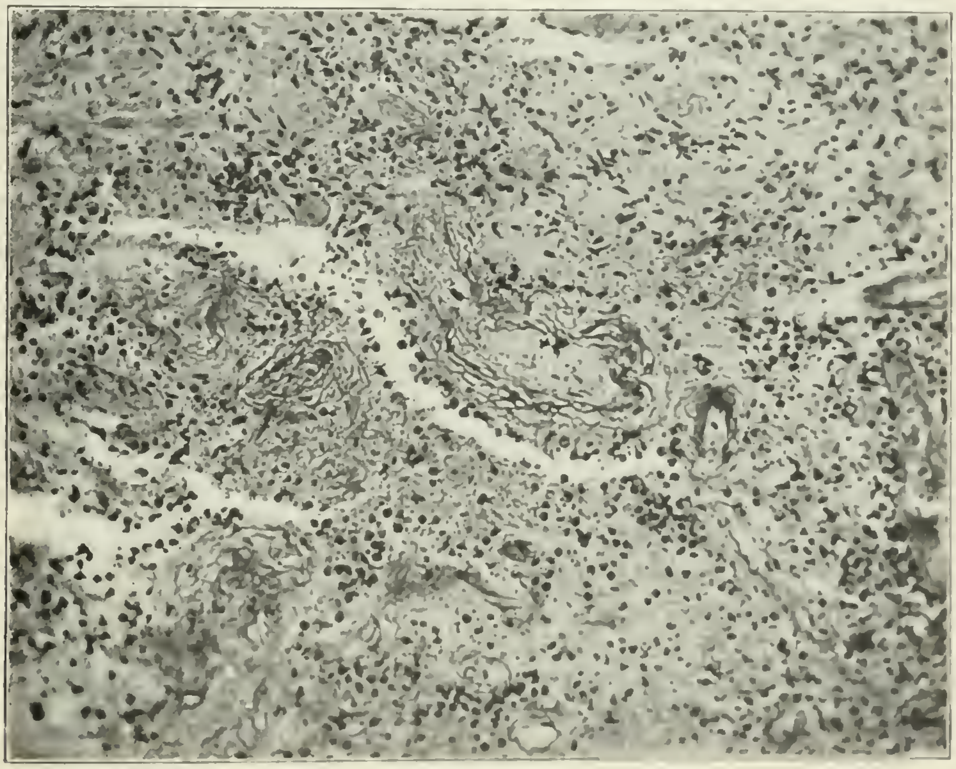


FIG. 30.

Case 12.—In a necrosed area. In the centre of the field is a large vessel, pervious, containing blood. Its wall is meshed by degeneration. To the left is another in the same condition but probably thrombosed.

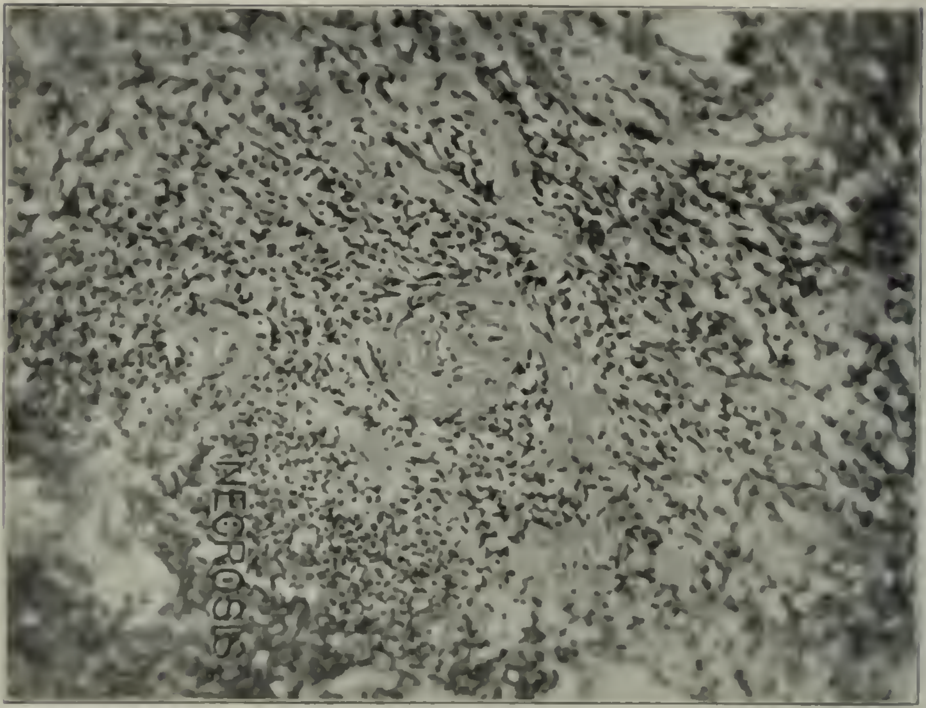


FIG. 31.

Case 12.—A vessel on the border of a necrosed area. The appearance may be produced by organized thrombus.

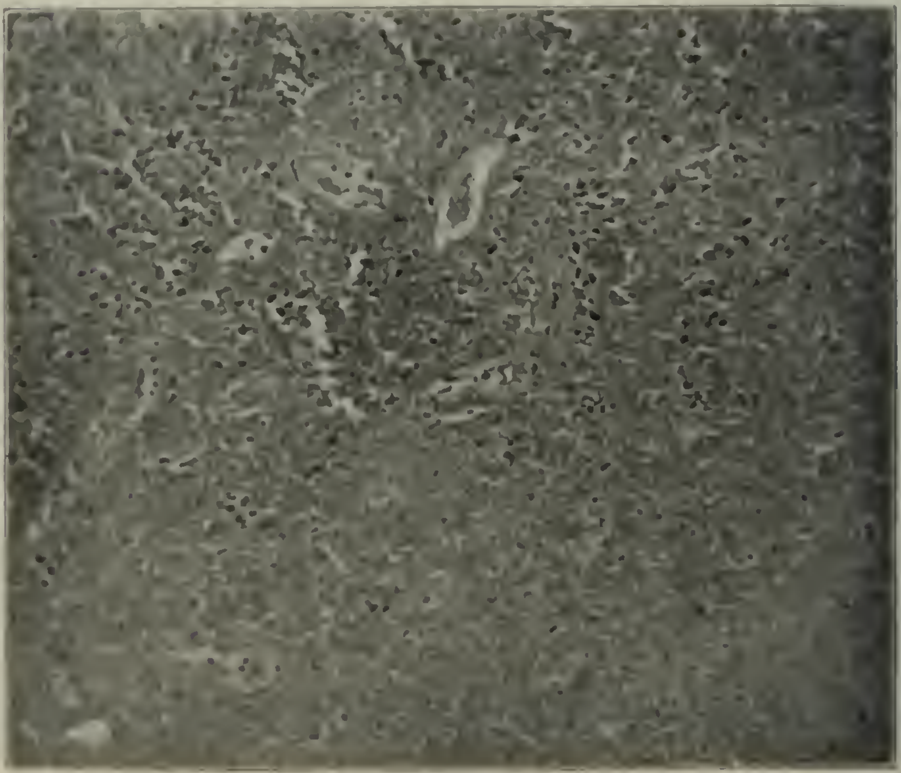


FIG. 32.

Necrosis. Granular amorphous ground substance with only a few nuclei remaining undergoing chromolysis.

different from the full, round bodies shown in so many of the active growths above. The rest of the field is made up of feebly staining amorphous débris, with here and there the remains of a blood-vessel also bearing evidence of decay.

Cyst Formation.—The glioma shows the tendency to cyst formation perhaps more often than any other group. Pathologically this may be considered as a degenerative process, but clinically it may be as disastrous as the more malignant forms. Glioma cysts, which are sometimes single but more often multiple, may certainly be drained with temporary and even prolonged benefit, but it is doubtful whether the growth of the surrounding or underlying tumour, if of the active kind, is modified to any extent, and there is always the fear that by interference latency may awake to activity. This is, however, a risk that must be taken, in the event of operation disclosing an obvious cyst.

The simplest and earliest evidence of cystic tendency is shown in the rarefaction of the glia-stroma which may be seen in so many apparently innocent-looking growths. In its full development it presents a superficial resemblance to an emphysematous lung.

Case 13.—E. W. H., a man, aged 30 (Dr. Ormerod), gave a long history commencing with a fit, general convulsions, three years before admission, general drowsiness a year before that; but the fit has been reckoned as the first symptom—sixteen months, vomiting attacks, two months, weakness right leg. Vision: right, $\frac{6}{38}$; left, $\frac{6}{9}$. Consecutive atrophy of the right optic disk and intense neuritis of the left. A frontal growth of a quiescent type was suspected. He improved in hospital, and was discharged to report progress later. He died one year after, and Dr. Stewart made a post-mortem examination outside, and found a large right frontal tumour and a small left frontal, one of the few multiple gliomata.

Fig. 33.—The cysts occur in the midst of simple glioma structure and the section shows no evidence of malignity; but of course if cysts continue to enlarge by increase of their fluid contents, such a growth, however innocent pathologically, is clinically malignant from simple mechanical increase in bulk.

Cyst formation, in fact, would appear to be an evidence of long life, from the pathological standpoint, and the process rather one of atrophy than of activity.

In conclusion, it is evident that the glioma, when it enters upon an active stage, by the very exuberance of its activity carries on within itself a process of self-immolation. Also that this aspect of the question centres round the blood-vessels, which may increase vastly in number—an angiomatous stage; become blocked—an intimal proliferative stage; thrombosis spreads backwards into larger vessels—a thrombotic stage; and lastly there results necrosis of the area concerned. If this is the true sequence and proper interpretation there may be some hope of treatment in the future by some application of ultra rays after removal of the bone, such as has given results in some other vascular growths.

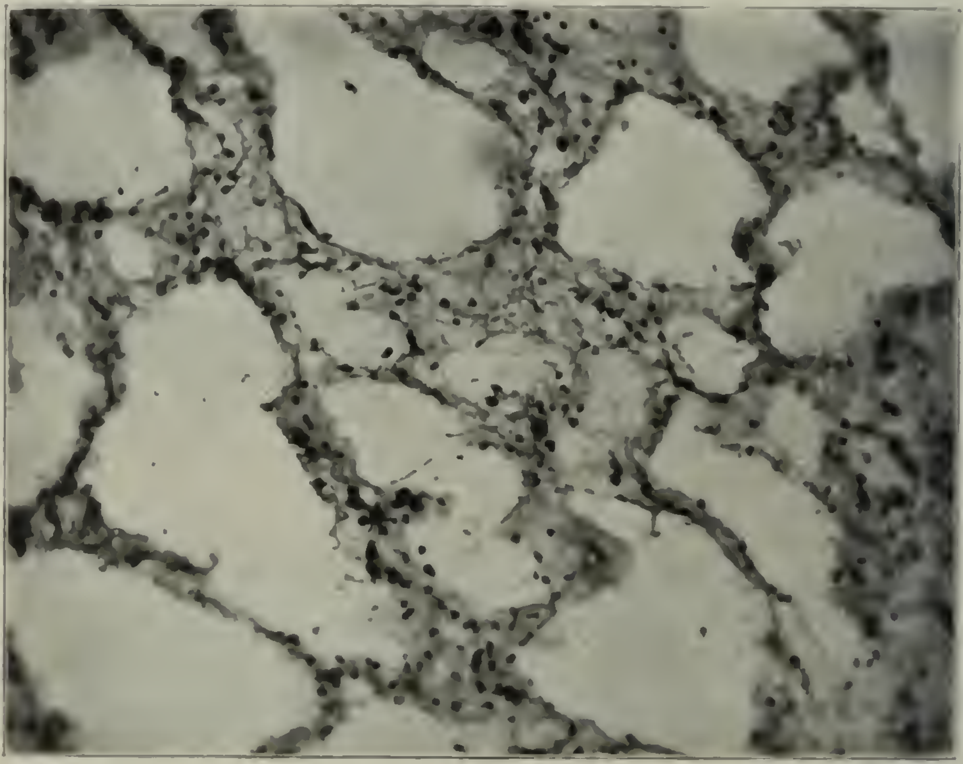


Fig. 33.

Case 13.—Cyst formation, in a glioma of long duration. The glioma tissue presents no appearance of activity.

But this is only one side of the matter. The larger question still remains, how to meet the forces that are seething within the rapidly growing tumour. Complete recovery of the diffuse forms is practically impossible. One may almost assume that the earliest possible stage of growth, when the tumour might conceivably be removed completely, is undiagnosable in most parts of the brain. A removal as complete as possible seems to be followed by increased activity, and recurrence, or, worse still, a relatively latent growth, may be awakened into malignity. It seems that in the present state of our knowledge we must be content with relieving pressure by decompression in all gliomata, lest worse befall.

Neurological Section.

November 21, 1912.

Dr. H. H. TOOTH, C.M.G., President of the Section, in the Chair.

? Pituitary Tumour.

By H. CAMPBELL THOMSON, M.D.

H. M., MALE, aged 35. The patient first came under observation on October 24, 1912. He then complained that for the past month he had been continually wanting to drop off to sleep, and for rather a shorter time he had been troubled with headache and giddiness. He had vomited on two days, several times each day. About three weeks before he had also had a period of loss of memory which extended over two days, and that time is still a blank to him. Pulse was 68. The chief signs are: Commencing pallor of the optic disks. Contractions of both white and colour fields of vision; the field for green being well inside that for red. No changes in the reflexes. Wassermann test negative. Nothing more definite has developed since he has been under observation. He has vomited occasionally, independently of food. His headache is mainly over the right eye, and he says he has very occasionally had double vision. The signs suggest a pituitary tumour.

DISCUSSION.

Dr. WILFRED HARRIS asked Dr. Campbell Thomson whether he had tested the patient's carbohydrate tolerance. It seemed to him that although there was some suggestion of cerebral tumour, the actual positive proofs of pituitary growth were few. He had a patient with very clear evidence of pituitary tumour now under treatment, and had not yet tested her carbohydrate tolerance to the point of vomiting, but she was able to take 7½ oz. of glucose without any sugar appearing in the urine. In some of the cases, it was said, the glucose could be pushed to the actual point of vomiting without the appearance of sugar.

Dr. CAMPBELL THOMSON, in reply, said that he had not yet tested the patient's carbohydrate tolerance. There was no sugar in the urine. In reply to the President, he said that he had made a radiological examination and the result was negative.

? Peroneal Atrophy.

By JAMES TAYLOR, M.D.

MALE patient, aged 36. Admitted on account of weakness below the knees, deafness, and impairment of vision. The deafness came on suddenly twelve years ago in the left ear, in the right ear eight years ago, and about this time also his vision began to fail, and his legs to become weak. Now the condition is one of complete deafness in both ears, restricted field of vision in each eye, with atrophic disks, and wasting of the peroneal and anterior tibial groups of muscles. The knee-jerks can just be obtained, and the thighs, although small, are voluminous compared with the legs. There is no affection of the upper limbs, and so far as can be ascertained no anæsthesia. There is nothing significant in his family history except that he says that a sister was deaf, and had bad sight and wasting of the upper limbs.

The case is shown to elicit opinions as to whether it is a somewhat unusual one of peroneal atrophy, and as to the relation, if any, between the deafness and visual effect and the muscular wasting.

DISCUSSION.

Dr. JAMES TAYLOR said that since coming to the meeting he had heard from Dr. Head that a sister of this patient had died at the London Hospital fifteen years ago, and that hers was a case undoubtedly of peroneal atrophy. There was some degree of deafness in this previous case, but, he believed, no history of defective vision. His object in bringing the case forward was to elicit from the experience of members any opinions as to whether this combination of peroneal atrophy with deafness to such an extreme degree, and also with visual failure due to optic atrophy, was at all common. Had members any cases in which there had been peroneal atrophy with anything like the interference with the auditory nerve that there was in this case? In reply to Dr. Ormerod, he said that the patient could not hear anything at all with either ear.

The PRESIDENT (Dr. H. H. Tooth, C.M.G.) said that he had never seen this symptom-complex, and certainly thought that as regarded the peroneal form of the atrophy it was fortuitous. It was very curious that the patient's sister should have suffered similarly from the ear, although in her case there seemed to be no particular visual defect. It was interesting because it showed two family conditions which he would have considered quite independent.

Dr. HENRY HEAD described the case of the sister of Dr. Taylor's patient, who died at the London Hospital fifteen years previously. She was admitted to the wards in a generally wasted condition and looked as if she had been starved. In addition to the general wasting, however, there was local peroneal wasting. The feet were deformed exactly as in her brother. The sight was a little defective, but there was no gross optic atrophy. Deafness was a feature of this case also. Nothing was discovered in the spinal cord ; indeed, the case stood by itself, and was extremely unsatisfactory from the pathological point of view.

Dr. F. E. BATTEN, referring to the examination of the spinal cord in Dr. Head's case and its negative result, asked if, since changes in the posterior columns had been found in all recent examinations of peroneal atrophy, Dr. Head considered his own case came into that category?

Dr. T. GRAINGER STEWART asked if Dr. Head examined the auditory nerves and the brain in his case. It was possible that they would have shown auditory tumours. He had had under his care a family consisting of a father and mother and six children. The father and four of the six children had suffered from bilateral tumours on the auditory nerves, and in four of the cases secondary optic atrophy had supervened. The most interesting feature, however, was that the father and the eldest son had developed myopathy affecting the facial shoulder-girdle and pelvic girdle muscles. These two patients therefore showed a secondary optic atrophy, bilateral deafness, and myopathy. The post-mortem examination of the eldest son showed that the muscular atrophy was myopathic and not due to multiple tumours on the spinal nerves.

Congenital Cerebellar Ataxy.

By LEONARD GUTHRIE, M.D.

THE patient is a boy, aged 6. He was delivered by forceps, and was much cyanosed at birth, requiring artificial respiration for two hours before he breathed naturally. There was no definite injury to the head. As an infant he was always weak and delicate, suffering from abscesses on his face at 2 months, and from bronchitis at 8 months of age. Family history unimportant. At the age of 3 he had never had normal use of his limbs, and was unable to stand or walk. Intelligence was not high, but not markedly defective. Memory and attention were poor. Speech drawling, "sing-song," and indistinct. Vision: Optic disks and pupils were normal. Nystagmus was especially noticeable on deviation to right side. No strabismus. Other cranial nerves were normal. Motor functions: No definite paralysis, but general weakness of all muscles, especially those of the neck; head tended to "loll": no wasting of any muscles. Upper extremities: Coarse tremors and marked ataxy were present on voluntary movements; he could not feed himself. Lower extremities: Weakness but no wasting of muscles; no hypotonia. Reflexes: Superficial were present, deep, rather exaggerated; plantar response was negative. Sphincter action normal. Electrical reactions and sensation were everywhere normal. Equilibrium: He was at that time quite unable to maintain erect position. When placed on his feet he swayed to and fro, or from side to side, and would fall at once if unsupported.

Present condition (three years later): Intelligence good. Nystagmus much less apparent. Speech still indistinct and slurring. Ataxy of upper extremities very marked, but can control movements to some extent by effort. Can now stand alone and walk a little, but gait is tottering, and resembles that of spastic paraplegia, though his limbs are not spastic. Plantar response is now extensor.

The case illustrates the improvement which may be looked for in "congenital cerebellar ataxy."

DISCUSSION.

Dr. F. E. BATTEN thought that Dr. Guthrie's was a very typical case of congenital cerebellar ataxy. Dr. Guthrie had asked whether children might be expected to recover if there were signs of pyramidal affection. The cases of ataxia showing definite signs of pyramidal change were those which did *not* do well. The fact that extensor plantar response was not present when the child was first seen and was now present pointed to the disease being progressive, and might be placed in the category of progressive cerebellar ataxy. Several such cases were described, the children having been in early youth fairly normal, and having then developed ataxy and shown progressive degeneration. This feature in the case seemed to point to the progressive character of the pyramidal degeneration. It was possible that the extensor response might have been present before and not have been elicited. Certainly it was quite definite.

Dr. E. FARQUHAR BUZZARD did not agree with Dr. Batten that the extensor response was necessarily a sign of a progressive degeneration. At the age of 3, when the first examination was made, the child had not had the normal use of his limbs, so that the absence of an extensor response might be regarded as natural. With the advent of a certain amount of use in his limbs the presence of an extensor response in a later year did not mean necessarily that the pyramidal defects had arisen in the interval.

Dr. F. E. BATTEN said that Dr. Buzzard raised an extremely interesting point. Did he mean to say that in the case of children in whom the pyramidal tract was defective an extensor response would not be obtained before they began to walk? He held that a typical extensor response might be present at the age of a few months, and considerable importance might be attached to the observation if the plantar response was elicited in the right way.

Dr. FARQUHAR BUZZARD said that, in spite of Dr. Batten's contention, his opinion was that in cases of non-development of the pyramidal tract, even up to 3 years of age, it was possible to obtain a type of plantar response unlike the pathological extensor response, and to find the latter when the child had begun to use the lower limbs for getting about.

Dr. GUTHRIE agreed with Dr. Batten on the point of contention between him and Dr. Buzzard. He thought that all children who had never walked did show an extensor plantar response, and the interesting thing in his case was that the child did not show such a response three years ago, but that now it was obtainable. With regard to Dr. Batten's remark that the response might have been present three years ago and not have been elicited, the fact was that the child was under observation for over a year in the hospital, and was constantly being tested. The plantar response was certainly not extensor three years ago, though it certainly was now.

Nystagmoid Movements of Palate and Lids, Lateral and Rotatory Nystagmus, Cerebellar Incoördination.

By E. G. FEARNSIDES, M.B.

(For HENRY HEAD, M.D., F.R.S.)

K. N., A MARRIED woman, aged 41. Her previous health had been good. In January, 1909, she had a "stroke." Whilst at work she suddenly felt giddy, fainted, and lost consciousness for about an hour; on regaining consciousness she was totally unable to speak, and was paralysed completely down the right side (face, arm and leg), and had great difficulty in seeing objects. The weakness of the right side improved rapidly, and in about a month she was able to talk freely and get about readily. Latterly she has suffered from severe headaches, lapses of memory, cramps of the legs at night, and feelings of intense unsteadiness in the right arm and right leg.

Present condition: Extreme arterio-sclerosis with hyperpiesis. Blood-pressure 240 mm. Enlarged left ventricle. Accentuated aortic second sound. Urine, specific gravity constantly low, 1010 to 1019, acid, a constant trace of albumin. Wassermann absolutely negative. Intelligent, observant; memory bad. Speech monotonous, articulation poor. Motion: Right cerebellar incoördination of arm and leg; no sensory loss. Reflexes: Knee-jerks brisk, right and left, no ankle clonus; plantars on each side flexor, abdominals readily obtained right and left. No sphincter trouble. Cranial nerves: Dissociated eye movements, frequent divergent squint; lateral nystagmus right and left; unilateral rotatory nystagmus right; pupils normal; nystagmoid movements of lids with deeper nystagmoid movements of eyeball on closure of eyes. Jaws act naturally. No sensory loss in trigeminal area. Supranuclear weakness of right face. No internal ear deafness. Palate: Rhythmical to-and-fro movements of both halves similar to those seen in the eyelids; tongue straight, steady; larynx and deglutition natural. Fundi: Silver wire arteries, no retinitis, no hæmorrhages.

DISCUSSION.

Dr. FEARNSIDES added that he would like to hear the opinion of members as to the actual site of the lesion in this case. On the history and general signs a vascular origin was certain. He suggested that a hæmorrhage into the mid-brain in the region of the posterior longitudinal bundle was the probable cause.

Dr. JAMES COLLIER said that recently he had under his care a similar case of ocular spasm in which certain symptoms occurred definitely relating to the mesocephalon. His patient had a loss of upward and downward movement of the eyes, and the condition appeared traceable to a lesion of the upper part of the third nucleus.

Tetanus; Chloretone Poisoning; Recovery; followed by Polyneuritis.

By E. G. FEARNSIDES, M.B.

(For RUSSELL HOWARD, M.S.)

B. B., A BOY, aged 13, living at Walthamstow, of healthy stock and good previous health, on August 31, 1912, whilst playing on some planks, ran a piece of old iron into his perineum. At the time there was little or no abrasion of the skin and no notice of the wound was taken.

Five days later (September 4) stiffness of the right leg set in. On the eighth day after the accident (September 7) he developed a tender lump, of the size of a hen's egg, on the right side of the perineum just in front of the anus, and was admitted to the London Hospital. On the day of admission he was given an anæsthetic, and ½ oz. of foul, stinking pus was evacuated from a perineal abscess which had no deep connexions. The abscess was drained and a tube inserted. Unfortunately the pus was not examined further. At the time of admission he was extremely irritable and resented all interference. He walked badly and complained of stiffness and pain on movement in the right leg and back, and passed urine and fæces incontinently. No signs of disease could be found in the leg, back, heart, lungs, urine, or nervous system. The wound drained well, but the general irritability and stiffness of the right leg and back, with acute pain on movement, persisted. On September 10 the tube was removed and an attempt was made to get the boy up. He was then found to be unable to stand and to become intensely stiff everywhere on the slightest manipulation. On the thirteenth day after the accident (September 12) the stiffness and pain, which until then had been confined to the right leg and back, increased and spread to the left leg and jaw, and he developed an erythematous rash around the site of the perineal wound. He now lay by preference on his face with his back over-extended and arched backwards. On address or manipulation he fell into general tonic spasms. His face showed a risus sardonicus. He was unable to swallow and complained of much pain in the stiff muscles. His mentality throughout remained unimpaired. On the evening of September 13 he developed a punctate erythema on the neck, chest, and sacrum. The erythema was followed by the appearance of sudamina, and for four successive days recurrent crops appeared. On the fourteenth day after the accident treatment with antitetanic serum was begun. He received subcutaneously 20 c.c. twice a day on September 13 and 14, and 40 c.c. twice a day on September 15 and 16, and on September 13, 14 and 15, 120 gr. of potassium bromide and 60 gr. of chloral hydrate. These drugs controlled the spasms but little, and on September 16 the administration of large doses of chloretone (30 gr., four-hourly) was begun. The chloretone controlled the attacks of spasm, but led to the development of coma and generalized broncho-pneumonia, with a purulent discharge from nose and mouth. On September 17, 18, 19 and 20 he lay comatose, stiff, blue, and only responsive to the strongest stimuli, and was considered on all these days moribund. On September 21 he regained consciousness, and with this the stiffness and opisthotonos returned. Between September 23 and 26 the broncho-pneumonic signs cleared. The stiffness in his back and legs disappeared slowly, first in the left leg, later in the right leg, and last of all in the back. As soon as the attacks of spasm disappeared the patient showed grave muscular weakness everywhere and double drop-foot.

Present condition (November 9): Much general muscular weakness and severe general muscular wasting. Wasting bilateral and fairly symmetrical, and, except for the muscles at the front of the legs, does not pick out any special group of muscles. Double drop-foot: grave weakness of thigh muscles and erector spinæ. Unstable in standing; spine cannot be straightened voluntarily. Gait steppage with forward progression by means of buttock and adductors. Reflexes all extremely brisk and ready. No sensory loss. Feet blue and œdematous. Cranial nerves and fundi good. Sphincters since middle of October well controlled. In both right and left lower limbs the extensor longus digitorum, the extensor longus hallucis, the tibialis anticus, and the peronei gave no response to strongest coil stimuli and a diminished but fair, sluggish contraction to cells with longitudinal response; all the other muscles of calves, thighs, buttocks, erectores spinæ and upper limbs gave normal responses.

DISCUSSION.

Dr. FEARNSIDES said that there were three suppositions to be considered in this case: (1) That the polyneuritis was due to the chloretone given in poisonous doses, which caused the coma; (2) that it was due to the serum (which was unlikely); (3) that it was due to the tetanus. He had been unable to find in literature any cases of chloretone poisoning followed by peripheral neuritis. He thought, however, that the condition was most probably consequent upon an overdose of chloretone.

Dr. F. E. BATTEN said that he thought the cause of the peripheral neuritis in this case was neither chloretone, serum, nor tetanus poisoning, but was due to the presence of the septic abscess. With regard to the possibility of chloretone giving rise to peripheral neuritis, recently he had an opportunity of seeing a child poisoned with chloretone. The child was admitted for chorea and was given chloretone, 10 gr. every four hours. Developing a rash, it was removed to the isolation ward. He did not see the child until it had been isolated for ten days, and then he was told that it had passed into a curious condition of paralysis. He found it with complete flaccid palsy of all its limbs. Respiration was shallow, swallowing difficult, and all deep reflexes were abolished. There was no rise in temperature, and the child was conscious. The muscles all responded to a fairly strong faradic current. The condition had come on twenty-four hours before being seen. It was found that the child had been taking chloretone to the extent of 1 dr. a day. On stopping the chloretone the child slowly improved. It was four to six weeks before the reflexes returned, and two months before the child was well and able to get up. Since then the child had been in the hospital again for chorea, and with the usual treatment was well in four or five weeks. This was an interesting case of chloretone poisoning, but in the case before the meeting he preferred to look upon the abscess as being the more probable causative factor, and not the chloretone.

Dr. LEONARD GUTHRIE asked what treatment had been employed in Dr. Batten's case before the patient was admitted to the isolation ward. It sometimes happened that large doses of arsenic were given in such cases, and this might account for the neuritis.

Dr. BATTEN pointed out that the child he had mentioned was in the hospital ward for four or five days, and in the isolation ward for ten days before the symptoms of poisoning were observed, and that there were thus at least fourteen days during which the child certainly did not have arsenic. It could scarcely be suggested, therefore, that the condition arose as a consequence of arsenical poisoning. Neither would arsenic explain the curious flaccid palsy seen all over the child, nor the bulbar symptoms. This was certainly not a case of arsenical neuritis.

Dr. G. NEWTON PITT cited the case of a child with chorea, to whom 5 gr. of chloretone were administered three or four times a day. The child passed into a condition of stupor and, later on, had a general flaccid paralysis, which lasted for ten days and then cleared up completely. This paralysis was undoubtedly due to the chloretone. He had seen a slighter degree of temporary paresis in another child due to the same cause.

Dr. M. A. CASSIDY described two cases of chloretone poisoning which had come within his experience. One was the case of a child treated as an out-patient, who had 5 gr. of chloretone three times a day; the other, a woman, received 5 gr. four-hourly for three days. Both patients developed flaccid paraplegia and became lethargic, but not comatose: both recovered without any evidence of peripheral neuritis.

The PRESIDENT said that, in his own experience, two patients lost their knee-jerks after quite small doses of chloretone. He always looked carefully for the knee-jerks when the patients were taking arsenic. In these two cases, on stopping the chloretone, the knee-jerks returned within four or five days.

Family Myoclonus.

By Purves Stewart, M.D.

Case I.—A. H., aged 15. Patient feels perfectly well, and only came under observation after the discovery of the nature of the illness of his elder sister (q.v.). Pupils, cranial nerves, sensory, motor, and reflex functions all normal. Slight myoclonic twitches in numerous muscles of limbs and trunk (e.g., rectus abdominis, trapezius, deltoids, upper arm muscles, quadriceps extensor, tensor fasciæ femoris).

Case II.—L. H., aged 8, brother of previous patient. General health excellent. Patient feels perfectly well. No abnormal physical signs save in the muscles of the trunk and limbs. Myoclonic twitchings of deltoids, latissimi, erectores spinæ, abdominal muscles, glutei, adductors, &c. The twitchings occur in a small portion of muscle at a time, and are not sufficiently powerful to produce any movement of the joints.

Case III.: Myoclonus and Myotonus.—F. H., aged 18. Patient is the second of four children. One older brother, aged 20, is said to be healthy, but has not yet submitted himself for examination. The two younger brothers, aged 15 and 8 respectively, who are also shown to-night (Cases I and II), were said to be healthy, but on examination proved to be suffering from myoclonus.

A year and a half ago patient's mother noticed occasional twitchings of the right shoulder-girdle. Nine months ago the right scapula was noticed to have become prominent. This deformity has become progressively worse, up to the present time. When she first came under observation, seven months ago, there was localized tonic contraction of the proximal muscles of the right shoulder-girdle, especially the right trapezius. At rest the right scapula was displaced upwards, forwards, and rotated outwards, whilst its lower angle projected backwards for 1½ in. At that time the deformity entirely disappeared when the patient pushed both upper limbs horizontally forwards, or raised the limbs above the head, but recurred when the limbs hung down. The patient also exhibits numerous irregular myoclonic spasms of various muscles of the trunk and abdomen on both sides—e.g., rectus abdominis, biceps, supinator longus, quadriceps, adductors, &c. All the voluntary muscles of the body react normally to faradic and galvanic stimulation. Under observation the myotonic condition has become progressively worse. The deformity of the right scapula has become more marked, and latterly the left scapula has become similarly, although less severely, affected. The condition appears to be one of tonic contraction of certain muscles of the scapula and shoulder-joint. It does not interfere with voluntary movements. If the upper limb be actively or passively raised to the horizontal level or above it, the scapula moves in a contrary direction *en bascule*, as if the shoulder-joint were ankylosed. The fixity of the shoulder-joint can be temporarily overcome by passive movement, and the scapula can be replaced in its normal position against the thoracic wall. When this is done, however, the tonic contraction of the muscles rapidly reproduces the old deformity, so that the scapula projects in its old position. The tonic spasm of the right trapezius is still well marked.

DISCUSSION.

Dr. WILFRED HARRIS suggested that the third case was really a case of myopathy. It was quite obvious that there was myotonus contracture, but not, he thought, of the trapezius. In his opinion, the trapezius was not in spasm at all. The muscles which were in spasm were the supraspinatus and infraspinatus. The contracture of the supraspinatus underneath the upper fibres of the trapezius caused the appearance of spasm of the latter muscle. Spasm of the trapezius would cause a very different position of the scapula, which in this case was characteristic of trapezius paralysis. The case was very interesting to him, because he had a similar one under his care for several months. It was the case of a girl who showed, in addition to bilateral trapezius paralysis, not movements of myoclonus, but, rather, choreiform movements. She was aged 15, and had not walked since the age of 7. The case was one which he could not classify, and no similar case had been described to his knowledge. He looked upon it as a combination of myopathy and choreiform movements. Dr. Stewart's case appeared to supply a further link between myotonus, myopathy, and myoclonus.

Dr. PURVES STEWART said that at first sight the case suggested a myopathic element, but against this was the fact that all the muscles, including the lower, middle and upper parts of the trapezius, had normal electrical reactions. Dr. Harris had questioned the existence of spasm of the trapezius in this case. The speaker admitted that the spasm was unequal in degree, but he maintained that it existed, together with spasm of the supraspinatus and infraspinatus. The tonic spasm of the shoulder-girdle muscles developed unilaterally, that is to say, it began on the one side some months before it began on the other. This was also against a diagnosis of myopathy. He added that Dr. Batten and Dr. Guthrie had pointed out an additional sign that evening, consisting in the distinct muscle-sound heard on auscultating the tonically contracting muscles.

An Obscure Case of Athetosis, with Abolition of Tendon Reflexes.

By E. FARQUHAR BUZZARD, M.D.

H. O., A BOY, aged 12, was a healthy subject until June, 1911, when he had an operation for the removal of tuberculous glands from the right side of the neck. For three or four days following this operation he was desperately ill, and there was suppuration of the wound subsequently, so that he remained in bed for three weeks. It is impossible to obtain a clear account of this illness, but following in its train was noticed weakness of the left arm and leg. The mother soon noticed that he was always tucking his left arm behind his back and clenching his fingers, and this condition has not improved.

The patient is intelligent, with good memory and attention, and looks healthy. The pupils are normal, and the ocular movements are good within ordinary range. With extreme deviation in any direction there is a tendency to diplopia and to slight nystagmoid jerkings. The function of the other cranial nerves is normal with the exception of the tongue. This organ as it lies in the mouth is obviously asymmetrical, the left half being much bigger than the right and the latter shows perhaps a slight amount of atrophy. The left half of the tongue is in constant movement of an athetotic kind, and may be hypertrophied. On protrusion the tongue goes markedly to the right. Athetosis of the left hand constant. Very little wrong with the left leg except a slight tendency to inversion of the foot at the ankle. Good power in all movements. Abdominal reflexes present and equal on both sides; plantar reflexes flexor in type; arm-jerks obtained with difficulty; knee-jerks and ankle-jerks unobtainable on either side. No sensory loss except a slight impairment of sense of position in the left arm.

A Case of Post-encephalitic Diplegia with Involuntary Movements.

By E. Farquhar Buzzard, M.D.

Boy, aged 6, under the care of Dr. Turney in St. Thomas's Hospital. Healthy until four years ago, when he had an illness associated with constitutional disturbance, vomiting, general weakness, and constant crying. In the course of this illness, which lasted about fourteen days, he lost the power of standing and sitting, and subsequently developed involuntary movements affecting the head, eyes and limbs, which have persisted. With the onset of symptoms speech was lost, but has gradually returned, although articulation is indistinct.

Present condition: Patient lies on his back in bed with legs flexed at the knees and hips. Fine, jerky, involuntary movements are more or less constant in the eyes and limbs when the patient is actively awake, but these cease during sleep. They are more violent under observation and during attempts to carry out movements. Right internal strabismus is present. Pupils active. Swallowing normal. General weakness of neck, trunk and limbs, the patient only supporting himself in the sitting position with difficulty and quite unable to stand. Mental condition poor, and testing sensibility unreliable. Incontinence of bladder and rectum. Abdominal reflexes obtained; knee-jerks normal; plantar reflexes indefinite. Shape of head is abnormal, being somewhat high in proportion to its length, and narrowed towards the vertex.

Dr. BUZZARD said that with regard to the first of these cases, he had seen others in which there appeared to be a unilateral mid-brain lesion and absence of tendon-jerks, but he could form no idea as to the pathology or cause of this phenomenon. With regard to the second case, he wished to point out its strong family association with two of the cases exhibited that evening. One was Dr. Collier's case (*see* p. 64), which might be regarded almost as a unilateral example of what was bilateral in his own case. Both were cases of tremor or involuntary movement due to lesions in the neighbourhood of the red nucleus. In Dr. Collier's case the history of onset was very obscure. The other case which resembled his own was Dr. Fearnsides's (*see* p. 53), in which there were similar movements of the eyelids.

Atrophy of Distal Muscles in all Four Extremities. ? Cause.

By F. E. Batten, M.D.

E. D., female, aged 33. The patient has had three pregnancies: the first resulted in a miscarriage, the second and third in healthy children. After the second confinement, six years ago, the patient had weakness of the extremities for three months; from this she completely recovered. Three years ago, after her third confinement, her legs again became weak; a few months later her hands were affected, and she had pains in her limbs. One year ago she noticed wasting of the muscles of the hands, and for five months she has lost sensation, and has been unable to walk. The sphincters have always acted normally.

Present condition: The patient is a fat woman. There is a marked dorsal and lateral curvature of the back when in the sitting position. She cannot stand. She complains of great tenderness in the calf muscles on any movement of the leg. There is marked wasting of the muscles of both hands and forearms, and of all the muscles below the knee, with considerable loss of power. The upper arm and thigh muscles are well developed. The trunk muscles do not show any wasting, but their power is not good. Sensation: There is complete loss of cutaneous sensibility over the peripheral portion of all four extremities, also loss of sense of position, but pressure on the calves and movements of the foot cause pain. Reflexes: All the deep reflexes are abolished, and no response can be obtained from the plantar or abdominal reflexes; the electrical reactions show a diminution of response in all the peripheral muscles; the proximal muscles react normally. The Wassermann reaction is negative. The appearance of the skin has none of the features commonly seen in association with peripheral neuritis.

DISCUSSION.

Dr. Henry Head suggested that many of the peripheral nerves were undoubtedly thickened in this case. There was no doubt that the median nerves on the inner side of the arm were thickened, and some thought that the ulnar nerves were thickened. There was no sign of discomfort or pain on tapping or pressing the nerves, and the patient rather reminded him of a patient brought before the Section by Dr. Harris two or three years ago with extensive analgesia over the limbs. Professor Petren, who happened to be present on that occasion, pointed out that the nerves of this patient were thickened, and thought the case one of lepra. The man had been in

South Africa. But there were cases of neuritic thickening of the trunks of the nerve of unknown cause, which resembled lepra except that the skin lesions were absent.

Dr. WILFRED HARRIS said that he was sorry he could not give any further history of the patient recalled by Dr. Head. The patient was sent to England really for diagnosis and if possible for treatment, and when it was found that no improvement was possible he went back again to South Africa. In his belief the case was not one of leprosy, and he showed it as a case of syringomyelia. Dr. Petren tried to point out that the facial nerve was hypertrophied, but the speaker was quite certain that it was not. In Dr. Batten's case it seemed to him that the anæsthesia was not genuine. It was obvious that the patient had an organic disease, but the anæsthesia was largely an incident, and hysterical in nature. The anæsthesia was too total to be genuine. The patient's femur could be jarred into her pelvis, and she said that she felt nothing at all. This could not be genuine; there was some element in the case other than true organic anæsthesia. But that, of course, threw no light on the wasting. He believed the case to be one of chronic polyneuritis.

Dr. FARQUHAR BUZZARD said that the case really came into line with one upon which he did a post-mortem examination some years ago. It was the case of a woman of 30 or 40 years of age, in whom this condition was recurrent. She had exactly the same appearance of the hands and feet as Dr. Batten's patient. While under treatment for this, she quite suddenly had a fresh attack and died. She had nothing but peripheral lesions, although, of course, the cells of the spinal cord were degenerated as well as the nerves.

The PRESIDENT said that the case suggested to his mind peripheral neuritis, and reminded him in some respects of a patient, the wife of a doctor, whom he attended twenty-one years ago. The condition came on three weeks after her confinement, and Dr. Batten's case seemed to have some reference to confinement also. She lost consciousness for three days, and after her recovery was absolutely paralysed in the lower extremities. Though he did not make any notes at the time, his recollection was that the case presented itself as a more or less typical peripheral neuritis. He did not hear anything more of the patient until eleven years ago, when one leg had more or less recovered, while the other was paralysed, and the patient had complete foot-drop and total analgesia to the ankle, less absolute analgesia to the knee, and hyperæsthesia above to about the middle of the thigh. The interesting thing was that the patient, having foot-drop and contraction of the gastrocnemius, had been walking about on her toes, with the result that there was a corn on the big toe which became a perforating ulcer, and the toe was removed. The same thing happened with the other toes, and when the speaker saw her she had no toes on that foot at all, and was walking about on the ball of the foot, where also she had a corn and suppuration under it. She was fitted up with an apparatus which gave her a flat foot, and had had no trouble since. With regard to this case, one was so accustomed to see neuritis eventually get well, that when it did not one was perhaps unduly puzzled.

A Case of Unilateral Tremor resembling that of Paralysis Agitans in a Child.

By JAMES COLLIER, M.D.

C. S., A BOY, aged 3½, was quite healthy till he was 12 months old, when he was noticed to be clumsy with his right hand and to fall frequently in walking. At the same time the shaking of the right hand and leg began to be noticeable. These symptoms have been gradually increasing ever since. The general health has been good. He is a healthy-looking child of moderate intelligence. The optic disks, ocular movements and cranial nerves are normal. The right side of the face is somewhat smaller than the left. The right lower extremity is shorter and smaller than the left. The gait is hemiplegic and there is a little contracture in the leg. The movements of the right limbs are somewhat clumsy. There is constant rhythmic rolling tremor of right toes, foot and leg. Occasionally there is similar tremor in the right hand. The reflexes are normal.

Two Members of a Family in which Visual Defects and Loss of Knee-jerk have occurred during Three Generations.

By JAMES COLLIER, M.D.

FAMILY HISTORY: The mother of the older patient slowly became partly blind after her twenty-sixth year. She died of an acute illness at the age of 42. She was able to see well enough to get about up to the time of her death. She had no defect in walking, and no clumsiness of the hands. Two of her daughters were affected. The one developed partial blindness during late childhood and died of an acute illness at the age of 14. She had no defect of gait and was not clumsy in the hands. The other daughter (*Case I*) is aged 38. Her sight has been defective ever since she can remember, and has become much worse during the last ten years. She has now to be led about, but can see enough to do some of her housework. She has had no symptoms of ataxy. She has had five children. One died from measles and one from convulsions in infancy. Of her three living children one (a boy) is said to be healthy; one girl, aged 14 (*Case II*), has had failing sight for five years, and another girl (*Case III*) has recently begun to complain of defective sight.

Case I.—M. A. C., a woman, aged 36. Family history: Her mother's sight began to fail at the age of 26, and became progressively worse until her death from intestinal obstruction at the age of 42. She had no ataxy and apparently no other symptoms. Her sister's sight began to fail at the age of 10, and she was almost blind at the age of 14, when she died of acute tuberculosis. M. A. C. has had five children, of whom two died in infancy; one boy is healthy and the other two girls (*Cases II* and *III*) are now complaining of defective sight. Present condition: Very intelligent. Vision reduced to light perception; severe white atrophy of both optic disks; constant nystagmus; pupils react well. No ataxy. No sensory loss. Knee-jerks absent; no extensor response. Her vision has always been very defective. It has failed rapidly during the last five years.

Case II.—F. C., aged 14, daughter of the above. Her sight has been failing for five years, and during this period it has been noticed that she is becoming clumsy with the hands and that her head shakes. Present condition: Vision $\frac{6}{36}$; double optic atrophy; no scotoma; pupils react well; constant nystagmus; nodding tremors of head. Ataxy of upper extremities. No speech change. Back straight. Some loss of deep sensibility in legs. All deep reflexes absent; double pes cavus; double extensor responses. This case approximates to Friedreich's type.

Case III.—A. C., aged 12, younger daughter of M. A. C., has recently sought assistance for failing sight. Vision $\frac{6}{12}$; the optic disks appear normal; the fields are normal. No cause can be found for the defective sight. She does not present any other symptom or sign of nervous derangement.

Dr. COLLIER said that in the first of his cases there was no doubt as to the situation of the lesion in the region of the left red nucleus. The nature of the lesion was difficult to determine. Several members of the Section had, when examining the patient, expressed their opinion that a local encephalitis was responsible, but this seemed negatived by the fact that after very careful questioning the mother insisted that the trouble had come on insidiously without any sudden illness, and that it had become progressively worse. The lesion might possibly be a slowly increasing tuberculoma, but von Pirquet's test had proved negative in this case. With regard to the other cases, he commented upon the preservation of the light reflex in the presence of optic atrophy, the absence of any trouble of locomotion or clumsiness in some of the cases, and the presence of these latter in Case II which corresponded with Friedreich's type. He had seen several other cases corresponding with the type of Case I.

? Unilateral Friedreich's Disease.

By T. R. Elliott, M.D.

The patient is a girl, aged 16; for the last two and a half years she has been troubled by a progressive deformity of the right foot and of the spine; with this, walking has become a little unsteady. She is fairly well grown, though mentally slow. The right pupil is larger than the left. Neither nystagmus nor speech trouble are demonstrable. Arms not ataxic, and writing is quite steady. The spinal column shows well-marked scoliosis, and the right foot is arched in a position of talipes equinus, while the right leg is 1½ in. shorter than the left. No evidence of hip disease. The left foot is normal. The right knee-jerk is absent and the left is feeble. On the right side an extensor response is obtained, but on the left flexor. The erector spinæ is very wasted, but no muscles show actual paralysis. Ataxia cannot be satisfactorily demonstrated. There is an indeterminate history of "fits on the right side" with convulsive movements occurring six years ago. No other member of the family is affected.

DISCUSSION.

Dr. Elliott asked if it was possible for a disease due to tract degeneration, such as Friedreich's, to be markedly unilateral in its early stages. If this possibility were denied by the experience of clinical observers, then the alternative diagnosis of the case would refer it to an old attack of poliomyelitis. Of this there was no satisfactory history, and opposed to it was the patient's statement that the weakness had been slowly and steadily progressive.

Dr. E. Farquhar Buzzard said that the possible unilaterality of Friedreich's disease opened up an interesting question. Within the last week he had seen a young man, aged 23, who presented typical signs of peroneal atrophy. These came on practically in the course of last year. On the right side the knee-jerk was quite absent: on the left side he could obtain a flickering response. He found that the patient had consulted his (the speaker's) father eleven years ago, when he had rather an acute and obscure condition of the lower extremities. The right knee-jerk at that time was absent, while the left was brisk. The boy was sent to bed for four months, and then, to everybody's surprise, he practically recovered and went on living his ordinary life for ten years. He thought it possible that under favourable circumstances one might get a marked unilaterality in the development of a family disease.

Dr. JAMES TAYLOR doubted whether the supposedly healthy side was really quite normal in this case. There was a tendency, he thought, to the development of some deformity. Scoliosis must be the result of interference with the development of muscles on either side of the spinal column. He could not see why a case of this kind, which was so typical in other respects, except that there was no ataxia, should be placed outside the category because the symptoms were unilateral, or to a great extent unilateral.

Spinal Tumour and Scoliosis; Recovery after Operation.

By WILFRED HARRIS, M.D., and A. S. B. BANKART, F.R.C.S.

MRS. J., aged 57, for last seven years developed gradual marked scoliosis, convexity to right most marked at sixth dorsal spine. For last five years gradual onset of paraplegia with slight pain and girdle sensations. By Christmas, 1911, was bedridden, left lower extremity completely paralysed, but could lift right leg and move toes freely. Brown-Séquard syndrome well established, sensation being very slightly affected on left side, but moderately deep loss to touch and pain on right side up to level of xiphisternum. Double ankle clonus and bilateral extensor plantars. Sphincters had been weak, but recovered. Evidently she was suffering from pressure paraplegia, but it was difficult to connect this with the condition of scoliosis, though the site of maximum curve corresponded to the site of apparent pressure.

Operation on October 7 disclosed an endothelioma-psammoma, weighing 3 grm., adherent to inside of spinal theca, compressing the left side of the cord almost flat. Recovery since the operation has been uninterrupted.

Mr. BANKART said that he was unable to find in the literature any record of scoliosis associated with spinal tumour. For some years this case had been regarded as one of obscure arthritic disease of the spine, but he would like to point out that the curve was a typical scoliotic curve and had none of the rigidity which was associated with spondylitis; also spondylitis deformans had not been shown pathologically to cause compression paraplegia. Therefore they regarded this case as scoliosis associated with the spinal lesion, and no doubt it was due to the affection of the spinal muscles.

Case of Jacksonian Attacks.

By F. M. R. WALSHE, M.B.

(For F. E. BATTEN, M.D.)

M. M., A MARRIED woman, aged 26, is in good health. She has never been laid up. She has two children, aged 4 and 1¾ years; both are healthy. There have been no miscarriages.

Present illness: During her second pregnancy she commenced to have "drawing up" movements of the left arm. The left hand was drawn up to the shoulder for a moment and relaxed. These occurred every three to four weeks, and always during the night. Four months ago these ceased abruptly, but since then she has been subject to twitching of the left side of the face of daily and sometimes hourly occurrence. The attacks last for about a minute and are unaccompanied by any pain or other sensation. There is no loss of consciousness.

There is a tonic spasm of the left face lasting for about five seconds and followed by rapid clonic movements in which the right face is slightly involved. The lower face is most affected. The tongue is affected, and is protruded markedly to the left during the attack. Afterwards a left facial weakness of central type persists. There are no other physical signs in the nervous or other systems. Wassermann negative.

Partial Third Nerve Paralysis with Rhythmic Movements of the Pupil.

By R. A. GREEVES, F.R.C.S.

THIS case was shown at the meeting of the Ophthalmological Section on November 6.[1]

Mr. GREEVES said that he had been able to find only ten cases in the literature similar to the one he had brought before the Section. His own differed from all the others in that the eye affection occurred fairly late—i.e., in the seventh year; all the others were noticed in the early months of life, and were put down as congenital. In some of them only the movements of the pupil were present, without any lid or eye movement. The lesion appeared to be a nuclear one. He added, in reply to Dr. Harris, that in none of the published cases that he had collected was there any reference to a post-mortem examination.

---

[1] See *Proceedings* (present number), Ophthal. Sect., p. 23.

Neurological Section.

January 16, 1913.

Dr. H. H. Tooth, C.M.G., President of the Section, in the Chair.

Case of Myasthenia Gravis.

By James Taylor, M.D.

W. S., aged 57, a house painter by occupation, came first under observation in 1901, complaining of difficulty in opening eyes and weakness in arms. The drooping of the lids first came on eight or nine years previously; the weakness of arms a year before. There was a history of specific infection in 1875. Treatment had not been regular or continuous. He has had lead colic on various occasions, the weakness in the extensors of the wrist has been distinct at different times and he has had several attacks of acute gout.

Now the condition is much as it has been for some years past. There is double ptosis and almost complete paralysis of all ocular movements. There is, however, considerable variation in this. Sometimes the eyes are open fairly well, and at times there is a fair degree of ocular movement in different directions. There is also variable weakness in the arms and legs and in the neck muscles, and there is great difficulty in mastication. The reflexes are normal and no distinct myasthenic reaction has been elicited on this occasion. The case, however, is regarded as one of myasthenia gravis.

Dr. James Taylor said the interesting points in the case were the history of lead and the long duration of the condition. He had had the man under observation since 1901, and he was now practically in the same state as he was in that year, though the condition varied not only from day to day but also from one part of a day to another.

A Case of Tremor of uncertain Origin.

By Aldren Turner, M.D.

A. P., female, aged 35. Family history and past history *nil.* Right hand began to shake two and a half years ago, rendered worse if observed. Difficulty with writing, which increases tremor, and hand is supinated, so that pen and paper do not meet. Writing impossible the last twelve months. Difficulty in feeding herself on account of tremor. Symptoms increased by two bicycle accidents. Tremor began in left arm four months ago, similar to but less severe than in right. General health good; no sphincter trouble; no cranial nerve symptoms.

Present condition: Viscera and ductless glands, examination negative. Not emotional or obviously introspective. Cranial nerves and special senses normal. Power and nutrition everywhere good. Inconstant irregular tremor of both arms, left less than the right. When at rest, or holding a book unobserved, and always during sleep, the tremor is absent and the posture of hands is normal. It is at once brought on by observation or scrutiny of any kind, even when the hands are lying quietly on her lap. Under these conditions the tremor is greater on right than left. With voluntary movements both hands are about equally affected. Tremor is of moderate speed and varying range. With hands outstretched there is noticeable some "wandering of the fingers," and a tendency for extreme supination or pronation of the forearms, the latter predominating at the present time, together with some eversion, especially of the left hand. Although the tremor is much increased on voluntary movement, the direction of action is good. In finger-to-nose test tremor increases towards end of act.

Cannot write with either hand. Gait is normal. No suggestion of any Rombergism. Reflexes: All jerks brisk, abdominals active. Plantars sluggish, flexor on the left; some uncertainty about the right, but more flexor than extensor. No real improvement under treatment.

The President (Dr. H. H. Tooth) said he supposed one must conclude that the case belonged to the class designated functional, a useful pigeon-hole into which to put things which were not quite understood. It seemed to fall into line with the tics, torticollis, &c.

Case of Trophic Changes of Obscure Origin.

By HARRY CAMPBELL, M.D.

WOMAN, aged 26. Disappearance of the subcutaneous fat from all parts of the body above the pelvic region. The intra-orbital and mammary fat is retained. The fat began to disappear from the face when the patient was aged about 6, and since then the process of absorption appears to have spread downwards at the rate of about an inch yearly The lesion is presumably of a "trophic" nature.

DISCUSSION.

Dr. HARRY CAMPBELL added that the case had been under his observation for six years, and the history was that the patient was healthy and plump at the age of 6, at which time, however, the mother noticed the child getting thin in the face. From that time there seemed to have been an absorption of subcutaneous fat going on, which had gradually spread downwards. During the last six years it had spread about 6 in. The skin itself was well nourished, and the disappearance of fat seemed to be limited to the subcutaneous region; the orbital and intermammary fat was not affected. The hair in all the ordinary situations was abundant. Tests revealed no difference between the secretion of the sudoriferous glands in the affected and unaffected areas. The sebaceous secretion, however, was very active, and the mother said the odour from her was unpleasant; no other member of the family had it. The skin over the affected area was very greasy. Was it possible that the subcutaneous fat was being worked off by the sebaceous glands? He did not know that physiologists had discovered any trophic nerves for the sebaceous glands, but that these glands were under the control of the nervous system he did not doubt. He had observed the occurrence of a sudden greasiness of the skin in connexion with nerve storms.

Dr. F. PARKES WEBER said he had, in 1911, seen a similar condition to that of Dr. Campbell's patient in an unmarried Jewish lady, aged 27, who suffered from progressive atrophy of subcutaneous fat, decidedly less marked in the lower extremities than in the parts above the pelvis. As in Dr. Campbell's patient, the fat of the orbits and breasts had hitherto escaped absorption. However, in the similar case of a woman, aged 21, described and illustrated by Dr. Eugen Holländer, of Berlin,[1] the intra-orbital fat appeared likewise to have been diminished, so that the patient had a peculiarly cadaverous expression. Cases of the kind were probably not quite so rare as had been supposed, though Dr. Campbell's case, when he first recorded it,[1] was possibly the first one to be described. In a discussion at the Paris Société de Neurologie (July 11, 1912), Pierre Marie said that he thought "it was not rare to see females in whom the upper part of the body was emaciated in comparison to the lower limbs." Perhaps the condition might be regarded as a peculiar variety of emaciation, occurring in young women, and in some way dependent on the nervous system.

---

[1] *Münch. med. Wochenschr.*, 1910, lvii, p. 1794.

Two Sisters presenting a similar Right-sided Hemiparesis and Stunting of Growth dating from Birth.

By James Collier, M.D.

M. S., aged 14, and W. S., aged 12. The two patients are the two youngest children of a family of ten, and they both show an asymmetry of the two sides of the body, the right limbs and, to a less extent, the right side of the face being smaller and weaker than the left.

The family history on the mother's side is negative. On the father's side there is a statement that two paternal aunts of the father were paralysed on one side and walked "bent over," and also that a sister of the father had some affection of the spine. All these relatives are dead and no more definite information was obtained. Of the ten children in the family to which the patients belong, one a girl, the third child, died at the age of 5½ months of whooping-cough, and there is a vague statement that the doctor at the time said she "would be a cripple" if she lived. None of the other children, six boys and one girl, show any abnormality similar to that of the two patients presented.

The history of the two patients is very similar. Both were born at full term, and labour was normal and non-instrumental. Both were healthy as babies and neither has had any severe illness. Both were backward in learning to walk, and, when they did walk, walked on the toes of the right foot. Both, at the age of 5 or 6, were taken to a children's hospital and had an operation done (evidently a tenotomy of the right tendo Achillis), since which they have walked better. Both have had defective eyesight and have worn glasses for several years. Both use their right hands very little, although one, the younger, has been taught at school to write a little with her right hand.

---

[1] *Trans. Clin. Soc. Lond.*, 1907, xl, p. 272.

On examination, both present a similar condition. They are only moderately developed for their ages. They are not so bright as the other children, but were not backward in learning to talk. In the elder the optic disks are fairly normal, but the right is a little smaller than the left and is a little pale. There is a refractive error. In the younger child there is marked myopia (greater on the right side) and some choroidal degenerative changes. In both there is a very slight facial asymmetry, and the movements on the right side of the face are less well maintained than on the left. In both, the arm and the leg are well formed but definitely smaller in all dimensions and weaker on the right side than on the left. The loss of use in the right arm seems out of proportion to the actual weakness. There is no spasticity. There is no sensory loss of any kind. The deep reflexes (except the right ankle-jerk) are all present and brisk, and perhaps a little more brisk on the right side than on the left. The epigastric and abdominal reflexes are present and equal on the two sides. The plantars are definitely flexor on the left side, and indefinitely flexor (sometimes extensor) on the right. The gait shows a little halting on the right leg. Some knock-knee and some inversion of the right foot. There is no ataxia or spasticity. In the erect attitude the elder child tends to assume a faulty position of the trunk with a slight scoliosis in the dorsal region. There is no very obvious difference in size between the two sides of the trunk in either child.

DISCUSSION.

Dr. JAMES COLLIER added that the only case of infantile hemiplegia dating from birth he had had an opportunity of examining post mortem showed a scar which was of vascular origin. But why two children of the same mother should have an identical vascular lesion he could not explain. The paternal aunts were said to have been paralysed from early youth on one side, and both on the same side.

Dr. S. A. K. WILSON said one of the points of interest in these cases was the side of the body on which the hemiatrophy occurred. It had recently been maintained, in an admirable monograph on left-handedness, by Stier, that a *plus* anomaly—i.e., a developmental defect where there was hypertrophy—was more apt to occur on the right side of the body than on the left in right-handed people, whereas *minus* anomalies—i.e., atrophies—were more likely to occur on the left side. Such conditions as hemihypertrophy of the face, polydactyly, &c., were more likely to be on the right side, and syndactyly on the left side, in a right-handed person. Such statements as these obviously could not be either proved or disproved except by bringing forward a large number of cases; but Stier had advanced a large number of figures to show that there was some truth in the contention. Since his (Dr. Wilson's) attention was directed to the matter he had observed a number of cases, and though the number was much smaller and he was aware of the danger of arguing from small numbers, he felt inclined to admit there was something in the contention. Curiously enough, further light had been thrown on the subject in a report published by one of the dental surgeons of Berlin, who contended, and brought figures to support his view, that the teeth appeared on the right side earlier, in right-handed infants, than on the left side. Dr. Collier's present cases, however, seemed to show the opposite anomaly—the atrophy affected the right side, though presumably they were right-handed patients. Still, one could not write with the right hand, and the other could only do so a little, and they said they threw stones with the left hand. Yet one could not argue that they were essentially left-handed.

Case for Diagnosis: Slowly on-coming Cerebellar Ataxia, with Facies resembling that of Myasthenia Gravis.

By JAMES COLLIER, M.D.

A. S., AGED 32, a charwoman. Mother in asylum. No history of similar disease in family. Fourteen years ago limbs shaking, unsteadiness of walking; became emotional. Speed shaky and slower lately, also tremor of arms. No sphincter symptoms. Frequent remissions. She has always been able to get about. Never diplopia or failure of vision. Worse in every way last twelve months.

Present condition: Sleepy expression; rather easily amused; speech slow and jerky; tremor of head. Special senses good. Pupils normal. Slight nystagmus. Both lids hang rather low; no overaction of frontalis. Some volitional weakness of facial muscles; no paralysis. Tremor of arms on volitional effort and some ataxia of arms (asynergic type). Some weakness of trunk muscles. Spasm of calf muscles; no true hypertonus. Coarse tremor of legs during voluntary movement, with incoördination. Power fair everywhere, but not well sustained. Sensibility and sphincters normal. Gait inclined to be reeling; asynergic; tends to swing right arm with right leg; no spasticity. Reflexes: All jerks brisk; double flexor response; abdominals present, but sluggish.

DISCUSSION.

Dr. COLLIER added that he had seen myasthenia in connexion with tabes, and there was a case at the National Hospital on which, he believed, Dr. Buzzard made an autopsy.

Dr. FARQUHAR BUZZARD said that in the case of myasthenia referred to by Dr. Collier, the post-mortem examination showed no trace of any organic disease of the nervous system, and certainly not a suspicion of tabes. One or two lymphorrhages were detected in some of the posterior root ganglia. As a matter of fact, myasthenia was very rarely associated with organic lesions of the nervous system, although it was sometimes combined with Graves's disease. With regard to the case shown by Dr. Collier, he did not agree that the facies was typically myasthenic in character, and he thought that the peculiar lack of expression was the result of organic changes in the central nervous system, although he was unable to give the condition a definite name.

Case for Diagnosis. ? Cerebellar Ataxy presenting Typical Symptoms of Disseminated Sclerosis in an Undersized Boy, aged 13.

By JAMES COLLIER, M.D.

E. W., AGED 13. Family history and past history *nil*. Increasing difficulty in walking one year; staggers about but never falls. Thick, stuttering speech six months. Unsteadiness of hands three months. No sphincter symptoms; sight good; no pain.

Present condition: Well-nourished, undersized boy. Viscera normal. Intelligent, laughs easily; speech jerky, slow, and at times barely intelligible. Jerking movements of head. Vision and disks normal. Pupils normal. Movements of globes good, accompanied by nystagmus, or by extreme oscillation of head. No oscillation of objects. Intention tremor head and arms (left more than right) very well marked. Spine and trunk normal. Some increase of tone in legs; power good; jerky movement of legs during voluntary movement. Incurvation of little fingers. Sensation normal. Sphincters normal. Gait ataxic, broad base (much improved lately). Reflexes: All jerks brisk, no abdominal reflexes; double extensor response. Hoffmann's sign positive.

DISCUSSION.

Dr. F. E. BATTEN said he considered that this case represented a very definite type of disease of which many examples had been shown before the Section, especially by Dr. Guthrie. The symptoms suggested a cerebellar condition, but in Dr. Collier's case there was superadded the affection of the pyramidal system. In some of the cases previously shown there was evidence of pyramidal involvement. It seemed a pity to designate these cases disseminated sclerosis. Admittedly certain of its features were clinically like those of disseminated sclerosis, but it was possible to account for them by involvement of the cerebrum and cerebellum. Pathological evidence had been furnished by Michell Clarke, of Bristol, in a case in which there was progressive ataxia, associated with pyramidal symptoms. After death, Michell Clarke found changes in the cerebellum and cerebrum, but in this case there was a slow degenerative condition, whereas in Dr. Collier's case the condition was not progressive. He hoped Dr. Collier would alter the title of the case:[1] it would be a pity it should be indexed as disseminated sclerosis. The case should be kept under observation and, if possible, an autopsy made.

Dr. STANLEY BARNES said he had an opportunity of doing a post-mortem on a case with similar symptoms a few years ago. The patient was a girl, aged 12, and the diagnosis of disseminated sclerosis had been made by a consulting physician. She lived nearly two years from the onset of the symptoms; at the post-mortem there was found a diffuse tuberculosis in the pons, with two or three small patches in the cerebellum. He agreed with Dr. Batten's remarks about allowing such a case to go forward under the present title, as he knew of no case confirmed at autopsy of disseminated sclerosis beginning before puberty. In this case he felt that he would rather accept a diagnosis which involved a double lesion than one of disseminated sclerosis.

Dr. FEARNSIDES asked for an explanation of Hoffmann's sign.

Dr. ROBERT JONES said he tried to elicit the pupillary reaction, but he failed to do so; he therefore would like to know whether the pupil was under the influence of atropine. Some of the symptoms occurred to him as rather like those of juvenile general paralysis. He had, in his experience in Claybury, received a case in a boy, diagnosed by a leading physician as disseminated sclerosis with insanity, but which was juvenile general paralysis, and this was verified on post-mortem examination by Dr. F. W. Mott. The Wassermann reaction would throw much light on this, but he understood it had not been elicited.

---

[1] The title originally given was "Disseminated Sclerosis in an Undersized Boy, aged 13."

Dr. BIRLEY explained that Hoffmann's sign was tested for in the following manner: The patient's pronated hand is lightly grasped by the observer and the terminal phalanx of the index-finger is then flicked downwards (i.e., palmwards) by the observer's thumb. Under normal conditions the patient's thumb remains motionless. The positive sign consists of a reflex movement of adduction of the thumb, and is supposed to be evidence of a lesion of the pyramidal fibres going to the upper extremity, and to be the counterpart, therefore, of Babinski's sign in the lower extremity.

The PRESIDENT said he agreed with what had been said by Dr. Batten and Dr. Barnes as to the title of the case, and hoped Dr. Collier would change it.

Dr. COLLIER replied expressing his willingness to alter the title in accordance with the wishes of speakers. As a rule the boy had large pupils, but repeated testing by himself and his house physician yielded perfect reactions.

Shoulder-joint Lesions in Syringomyelia.

By T. R. ELLIOTT, M.D.

THE patient, a man aged 40, exhibits in either shoulder-joint the early and late conditions associated with syringomyelia. Thirteen years ago, after lifting some heavy weights, he found that his left shoulder was swollen to the thickness of his thigh. For this, which was not painful, he was ultimately, in March, 1901, admitted to University College Hospital with the present diagnosis. Only the left shoulder was at that time affected, and sensory loss was found only on the left side of the body from the cheek to the breast inclusive. A history was then given that one morning in 1898 he had awakened to find his left arm weak and the fingers altogether powerless. Recovery from this was a matter of a few months, and in 1901 the forearm and fingers were normal.

For the eleven years succeeding 1901 the patient was perfectly well, and felt no disability beyond the weakness of the left shoulder. His right arm was powerful. But in November, 1912, once more as a presumed result of heavy labour, the right shoulder began to "click" and swelled rapidly; pain and loss of power accompanied this. Now, two months later, the right shoulder-joint is distended with fluid and the right humerus is partially dislocated downwards. There is œdema of the surrounding tissues of the upper arm. X-rays show that degenerative changes had probably been in progress some time before the apparent injury; the head of the humerus is flattened, and ossified nodules seem to be lying in the bicipital tendon. The muscles enveloping the right joint are not wasted. The left shoulder-joint is destroyed. Stripped of its musculature, the acromion projects over an empty glenoid cavity. In the skiagram osteophytic outgrowths are seen encrusting this, while the humerus lies free below, its head gone and the upper end truncated at a sharp angle as though sawn across. The deltoid, despite extreme wasting, reacts to the faradic current. The cervical sympathetic is normal and the pilomotor reflex is unchanged over the chest. Pain and heat sensations are blunted over the left face, both sides of the neck, both arms, and over the chest as low down as the fifth or sixth thoracic. The plantar response is extensor. Cuts of the hand are painless, and heal quickly, but they lead to exuberant overgrowths of horny skin. These callosities were noticed before the shoulder trouble. The earliest phenomena were really in 1890, when an ill-made collar-stud produced a painless festered wound, of which the scar is still visible on the front of the neck; and when a painless whitlow of the left index-finger led to gangrene requiring amputation of the terminal phalanx.

Case of Jacksonian Epilepsy.

By C. M. Hinds Howell, M.D.

A. P., BOOKBINDER, aged 31. First seen on July 20, 1911.

History—July 15: When playing cricket received blow on left temple from cricket ball. Unconscious for a few seconds, but was able to continue the game after about fifteen minutes. That evening felt ill, head ached, and he vomited several times.

July 19: A fit involving right side of face, duration four minutes, with no loss of consciousness.

July 20: When examined was found to have very slight motor aphasia. No other signs. When under examination had a fit without loss of consciousness, affecting the right facial muscles only; duration about five minutes. Aphasia much increased for about twenty minutes after the fit.

July 24 (operation by Mr. Arthur Edmunds): A depressed fracture was found under the left temporal muscle, and moderate extradural hæmorrhage was found to have occurred from a branch of the middle meningeal artery. Fractured bone removed, and clot cleared out. Dura opened, underlying brain found quite normal. Patient made uninterrupted recovery.

After-history: Well for six months, then Jacksonian fits started again. They now commence in the right hand with progressive "march" up the arm. Consciousness is lost when movements reach shoulder. No physical signs of organic disease to be found.

DISCUSSION.

Dr. **Hinds Howell** said that he had brought the case before the Section for two reasons. First, because it illustrated a condition of motor aphasia arising in connexion with pressure on the cortex of Broca's area, the aphasia completely clearing up when this pressure was removed. This was interesting in connexion with the discussion, which had recently been going on, especially in France, as to whether this area played any part in the production of motor aphasia or not. Secondly, the case illustrated very well the clinical symptoms of an extra-dural hæmorrhage, giving rise to traumatic epilepsy. In this case the fits at first were of typical Jacksonian type, and if such cases could be benefited by operation, this one should have been. The operation had been successful in arresting the Jacksonian attacks, but some months later fits of a different character had commenced. The patient had not had bromide treatment at any time, and perhaps this should have been instituted from the first, but Dr. Howell had expected that the removal of the recent clot would cure the condition without further medical treatment. He would be glad to hear the experience of members of the Section in similar cases.

Dr. F. E. **Batten** said he would like to hear the experience of members in the matter of operating on cases of Jacksonian epilepsy. At the last meeting[1] Dr. Walshe showed a case which was under his care at the National Hospital, that of a girl who had had Jacksonian attacks on the left side of the face. The condition had existed for several months. Dr. Buzzard mentioned an exactly similar case in which the movements were limited to the side of the face, and in which, at operation, a local lesion was found. The patient shown at the last meeting had now been operated upon, and the surface of the cortex examined. No lesion could be found, except a certain thickening or opacity along the vessels. Nothing was done to the surface of the cortex and no needles put into the brain; the bone plate was replaced. The patient had continued to have fits. His experience of operation in cases of Jacksonian fits had been unfortunate. In but few was a local lesion found, and the fits continued unaltered either in frequency or severity. He would like to know whether this experience was exceptional in comparison with that of others.

---

[1] See *Proceedings*, p. 68.

Dr. WILFRED HARRIS said he agreed with Dr. Batten's remarks as to the futility, as a rule, of operating in cases of Jacksonian epilepsy. Many such cases were referred to the physician by surgeons at hospital, and that was usually his advice. But, in spite of that, he had just advised operation in a case. The patient was a chauffeur, and had a bad accident in which his head was knocked against a telegraph post and badly smashed. He was taken into hospital, trephined, and got well. That was three years ago. Two or three months ago he got knocked over by another motor-car, and his head bumped on to the ground on the soft place left by the previous trephining. He then had a fit in hospital which seemed to be of Jacksonian character. In the country he was operated upon, the opening being enlarged and a silver plate used. Following this he had another fit, and now had paresis of his arm on the opposite side. He (Dr. Harris) was asked whether he should have another operation, and had advised that it had better be done.

The PRESIDENT said there was another case in the hospital, that of a woman, who had a great number of fits. An osteoplastic operation was done, and at the top of the post-central convolution a softened area was found, but nothing else. She went on well for a time, but now she had returned, complaining of a large number of fits, without there being any evidence of growth going on underneath the flap. The appearance at the operation suggested a thrombotic area.

Dr. FARQUHAR BUZZARD asked how long before the first fit the injury was received. [Dr. HOWELL: Three days.] He agreed with Dr. Batten that operation in cases of traumatic epilepsy was extremely unsuccessful. One could see in epileptic colonies and infirmaries many cases of traumatic epilepsy which had been operated on, and, while all continued to suffer from fits, some were handicapped by the addition of hemiplegia or monoplegia, and others by having lost the aura which, previous to operation, had warned them of the advent of an attack. At the same time it was very difficult to come to a definite opinion as to when operation was justifiable and when surgical interference was contra-indicated. He felt that where there was evidence of possible deformity of bone or permanent thickening of meninges at the site of the injury, an exploratory operation was justified. On the other hand, he was strongly opposed to interference with the brain substance itself, and especially to the excision of so-called epileptogenous zones. In every case, before operation he made it quite clear to the patient and his relatives that surgical measures were not destined to cure the disease, and that they were carried out only with the object of giving medical treatment the best possible chance of success. Bromides should be administered from the time of the operation onwards and continued on the same line as in any ordinary case of idiopathic epilepsy. If these lines were adopted, it might be expected that operation in traumatic epilepsy would redeem some of its lost reputation.

Dr. ALDREN TURNER said he remembered two cases of operation for Jacksonian epilepsy. The first, at Queen Square Hospital, was a case in which the patient had been kicked on the forehead by a horse. The attacks were psychical in type, but there was a sufficient cicatrix on the forehead to cause him to suggest operation over the frontal lobe. On opening the skull the surgeon found what he regarded as a syphilitic condition of the membranes. The patient did fairly well for a short time, but within a year he was admitted to one of the asylums on account of an attack of post-convulsive mania, and he had since died. The other case was of more purely local character, the Jacksonian type of idiopathic epilepsy. The history supplied was that he had suffered from epilepsy for several years, and, about two years earlier, was operated upon by Krause for the removal of an epileptogenous zone. After the operation he believed the patient temporarily recovered from the fits which he had been having, but severe convulsive seizures again came on, and he saw him for acute mental symptoms following several major convulsions.

Athetosis of Left Hand with Tremor of Right Hand.

By E. G. Fearnsides, M.B.

(For Henry Head, M.D., F.R.S.)

E. R., a brewer's labourer, aged 67. Nineteen years ago, after a "cold" lasting fourteen days and accompanied by much headache, pains all over and general malaise, he had a seizure. He was walking along the road when he suddenly turned giddy and almost fainted. He did not lose consciousness. The giddiness was severe for about twenty minutes. He then walked home, a distance of some hundred yards, and was put to bed. During the next few hours his left face became twisted and shortly after this the left half of his body, his left arm, and left leg became weak, numb and cold. He remained in bed for about six weeks and was away from work for three months. The weakness of the left face, left half of the body, left arm and left leg, improved gradually, and he says that it is still improving, though the numbness and coldness have persisted almost without change. In recent times he has had several minor "giddy attacks," but these have not been followed by the development of any new paresis.

In August, 1911, he came under observation complaining of "indigestion," flatulence, nausea, morning diarrhœa, apparently associated with chronic alcoholism, and was found to have athetosis of the left hand, weakness and "coldness and numbness" of the left half of the body and a tremor of his right hand.

The patient is a married man. His wife has had thirteen children, all of whom survive. He admits alcoholic excess at one period of his life, but denies venereal infection, and the Wassermann reaction of his serum is negative. Family history unimportant.

Present condition: Well preserved. Radial and brachial vessels thick and tortuous. Blood-pressure by Riva-Rocci 140 mm. Chest emphysematous. Area of cardiac dullness small; left ventricle enlarged; aortic second sound accentuated. Lower margin of liver just felt beneath costal margin. Urine contains neither albumin nor sugar. Observant, intelligent, emotional, memory fair, speech natural. Special senses unaffected.

Cranial nerves: Pupils equal and react readily to light and accommodation; eye movements normal; no facial weakness; tongue straight, steady.

Reflexes: Knee-jerks and ankle-jerks equal and ready on both sides; no ankle clonus; plantar responses on each side flexor; abdominal reflexes obtained on each side.

Motion: All movements of left half of body and extremities awkward and less powerful than the corresponding movements of right side. Walks fairly well, but holds the left leg stiffly and directs it badly. Left thumb held abducted and fingers of left hand hyperextended, saddle-shaped, and unaligned. Muscles of left upper extremity, more especially those of the forearm, hypotonic. Fingers of left hand and, to a less extent, the left wrist, show slow involuntary movements associated with changes in the tonus of the muscles of the forearm; these athetotic movements are increased on any attempt at voluntary movement. Tonus of right limbs unaffected. Constant fine rapid movements at the smaller joints of the right hand, best seen when the forearm is supported. Similar movements occur in the right leg when the calf is supported.

Sensation: Spontaneous sensations—the whole of the left side of the body always feels "cold and clammy under the skin"; this is slighter in the face than elsewhere.

Thermal sensibility: Ice and water at 50° C. cannot be differentiated over the left hand and lower part of the left forearm. Water at 40° C. is not recognized over the upper part of the left thorax. The lesser extremes of heat and cold cannot be differentiated over the whole of the left lower extremity. He can differentiate heat and cold, but on comparison of the sensation on the two halves of the body he insists that they are "different" and "less hot" and "less cold" on the left side. Over the left lower extremity he tends to call 40° C. and 20° C. both "cold," saying that 20° C. is "colder." Thus he appears to have grave loss of sensibility to all temperatures over the left hand and forearm, less complete loss over the upper part of the left chest, whilst over the leg he tends to call all intermediate degrees of temperature "cold," but whatever temperature stimulus is applied to the left half of the body, left arm or left leg, if appreciated, it is said to be "less hot" or "less cold" than the same stimulus applied to the right side of the body.

With the left hand he is totally unable to appreciate *shapes*, *sizes*, *forms* and *weight*, and over the left half of the body there is grave defect amounting almost to a total inability to appreciate the *vibrations of a tuning fork*.

There seem to be no obvious differences on the two sides of the body and limbs in the sensations evoked by the prick of a *pin* and by stroking with *cotton-wool*. Spine and sphincters unaffected.

DISCUSSION.

Dr. FEARNSIDES asked for the opinions of members as to the seat of the trouble. Its nature, he thought, was vascular, and probably thrombotic. Was it a unilateral or a bilateral lesion?

Dr. S. A. K. WILSON said he regarded the case as interesting, because the association of athetosis on one side with tremor on the other must be rare. In answer to Dr. Fearnsides's question, he thought it was possible to account for most, if not all, of the symptoms by postulating a unilateral lesion. One could place such a lesion on the right side, in the extreme upper part of the pons, just below the red nucleus. Monakow's bundle decussated below the red nucleus and ran down on the opposite side. Believing, as most neurologists did, that lesions of the rubrospinal tract were associated with tremor, a lesion involving Monakow's bundle below the red nucleus after it had crossed would cause tremor of the right limbs. Again, there was the fillet, which must be caught in the lesion, probably the mesial part of the fillet. That skirted the red nucleus and went to the optic thalamus. In the present case he understood the temperature sense was affected, whereas touch and pain were not affected; there was dissociation in the fillet. The most interesting question concerned the athetosis. There was good reason to support the view that athetosis was caused by a lesion which was on the afferent side of the cerebral cortex. Many well-established cases had been described where a lesion in the superior cerebellar peduncle, or the red nucleus, or the optic thalamus, or between the optic thalamus and the cortex, had caused athetosis. The view he was adopting was that a lesion anywhere on the cerebello-rubro-thalamo-cortical path might occasion athetosis. If the lesion were to involve the superior cerebellar peduncle after it had crossed, it would produce such an effect on the opposite cortex as to allow of athetosis on the left side. This patient was arterio-sclerotic, and he agreed with Dr. Fearnsides that the lesion was probably vascular. There might be more than one lesion present.

A Case of Muscular Atrophy of Left Upper Limb.

By E. Farquhar Buzzard, M.D.

M. D., an unmarried girl, aged 26, has had no previous illnesses. Seven months ago she noticed that the left forearm and hand were always getting cold. Almost immediately wasting of the thumb was noticed. Weakness of the hand and limb was noticed subsequently. Both weakness and wasting have progressed steadily since. The hand is always cold and she has frequently a "pricking pain" referred to the point of the elbow. At times this is severe.

She is a pale, rather poorly nourished individual, but presents no abnormality beyond the local condition of the left upper limb. Cranial nerves and cervical sympathetic are normal. The whole of the left upper limb and shoulder-girdle shows some degree of muscular wasting. The periphery of the limb is most affected. The scapular muscles show very slight, but definite, weakness and loss of substance. Deltoid is similarly affected and at times shows fibrillation. The muscles of the arm and forearm are more affected and the small muscles of the hand show most weakness and loss of substance. The fingers cannot be completely extended. The tendon-jerks of the limb are brisk. There is no sensory loss. Electrical reactions are normal. The abdominal reflexes are brisk and equal on both sides. Plantars both flexor. The right upper and both lower limbs are in every respect normal. Wassermann reaction and skiagraphic examination of neck are negative.

Myasthenia Gravis.

By E. Farquhar Buzzard, M.D.

M. H., a girl, aged 17, has never been ill previously. Last Easter she had "influenza," during which she had pains all over, especially n the arms. Subsequently a feeling of "stiffness all over" persisted. It was only slight and in no way incapacitated her. During the last week in September she suddenly noticed that she was very weak. She became unable to do her hair or to raise her arms, and rising from a chair became a great effort; walking was very little affected. This condition has remained stationary since, and there have been no other symptoms whatever. She generally feels stronger towards evening. Sometimes after reading for any length of time her eyes get heavy and droop; this soon passes off if she stops reading. Her voice is always good. She has never had diplopia. The feeling of general stiffness remains.

She is a well-nourished girl, and presents no abnormality apart from her muscular system. She shows considerable weakness of the trunk and neck muscles and of the muscles of the shoulder and pelvic girdles. She cannot raise her head from the bed, nor make any attempt to sit up. She is unable to raise the arm above the horizontal position, nor can she rise from a chair. She is, however, able to walk. There is no wasting of muscles, and no sensory or reflex changes. The electrical reactions are normal.

Paralysis of Right Lower and Middle Trapezius.

By George Johnston, M.D.

N. T., a girl, aged 9, in August, 1912, suffered severe pain in the right upper arm below the point of the shoulder. This was followed after a few days by progressive weakness of the right shoulder and sticking out of the shoulder-blade.

Present condition: When standing at rest, with the arm dangling, the lower angle of the scapula is slightly higher than on the left side, the vertebral border being at the same distance from the spine as the left scapula, but the point of the right shoulder is much dropped, the clavicle sloping down to the right, while the vertebral column is curved with convexity to the left. When she rests her hand on her hip, or if she holds the arm out towards the right front, the scapula immediately becomes much winged, with the lower angle cocked upwards and inwards, and instantly strong contraction of the supra- and infra-spinatus is set up, causing swelling and hardening of these muscles. The upper portion of the trapezius is normal, as are also the rhomboids, serratus, levator anguli scapulæ, deltoid, and all the other muscles. No analgesia or other loss of sensation to be made out. Electrical reactions show well-marked R.D. of the lower and middle trapezius on the right side.

The lesion suggested is a neuritis of the cervical supply of the trapezius, though usually a lesion of the spinal accessory causes atrophy of the whole trapezius, lower as well as upper.

Dr. FARQUHAR BUZZARD thought that there was palsy of the serratus magnus as well as of the lower part of the trapezius, although this was difficult to prove.

Neurological Section.

April 17, 1913.

Dr. H. H. Tooth, C.M.G., President of the Section, in the Chair.

Gumma Cerebri: Results of Treatment. Some Histological Features.

By Howard H. Tooth, M.D., C.M.G.

During the ten years 1902-11, there were under treatment in the National Hospital, Queen Square, seventy-one cases of cerebral disease due to syphilis. At first sight this number seems surprisingly few, but vascular lesions and cases exhibiting symptoms of general paralysis have not been included. Of these, thirty-one gave definite localizing signs of intracranial growth, in fact many were believed to be due to tumour of some kind, and fifteen came to operation; sixteen were treated more or less successfully by anti-syphilitic methods. In addition nine were diagnosed as gumma cerebri, or pachymeningitis of uncertain situation, and all these improved very much on treatment. These make up a total of forty cases which form the subject of this communication.

The great majority of these cases occurred before Wassermann's discovery, and, therefore, in the absence of exact methods, the diagnosis rests on direct or suspected history of infection, post-operative or post-mortem findings, or susceptibility to anti-syphilitic treatment.

Results of Operation.

There can be no doubt that there are cases of gumma, or so-called pachymeningitis, which arrive at a stage in which treatment by the ordinary medical methods seems to be of no avail. The growth has become so extensive and so chronic that it must be treated as a tumour. Whether at this stage such a growth may prove amenable to the more active treatment of salvarsan, yet remains to be seen; opportunities of testing this point have not occurred yet in numbers sufficient for generalization.

TABLE I.—GUMMA CEREBRI. PACHYMENINGITIS. OPERATIONS.

No.	Region and nature of operation	Sex	Died after	Alive to date	No reply after	Before operation	After operation
1	R. frontal; dura excised	M.	—	—	7 weeks	S., fits frequent; verbal amnesia, dull, memory poor; V.a., R. $\frac{3}{60}$, L. $\frac{6}{60}$, opt. atrophy, R., L.h.	Great improvement, n symptoms; wound flap depressed
2	L. pre-central lower third; dura excised	M.	—	—	2 months	S.o., 1 fit; V.a. $\frac{6}{6}$, late O.n. + 5D.; local fit, R. arm, head to R.	Left in good condition, but still some O.n.; temporary R.h. and aphasia after operation
3	L. pre-central; dura excised	M.	—	3½ years	—	S., fits local, R. foot; R.h., O.d. normal	Improved at first, then fits, later incessant tinnitus; unable t work; improved after salvarsan
4	R. post-central; dura and cortex partially excised	M.	2 months	—	—	Gon., S.o., fits L. side; cerebration and memory defective; O.n., L.h.	Improved at first, then septic meningitis
5	R. post-central; dura and underlying cortex excised	M.	—	—	3 months	S., local convulsions, L. arm; mental change, amnesia, suicidal; paral. L. arm	L. hemiplegia after; no other information
6	R. post-central; dura and cortex excised	M.	—	7 years	—	S.o., local fits, L. arm; V.a. $\frac{6}{60}$, O.n. + 3D., L.h.; no improvement after 2 months' treatment; O.n. increasing	Able to work; occasional fits; L. hemiplegia
7	R. central and post-frontal; dura excised	M.	8 months	—	—	S., fits; L.h., dull, apathetic; V.a., R. $\frac{6}{18}$, L. $\frac{6}{9}$, O.n. intense; relapse after 1 month's treatment	Well for 4 months; recurrence; died of pneumonia
8	R. supramarginal and angular; exploratory incision; cortex sclerosed	M.	—	—	2 years	Gon., S.o., fits, vertigo; colour spectra, V.a. $\frac{6}{6}$, O.d. normal; L. hemianopsia after fits; spelling very defective	Great general improvement
9	R. central; exploratory incision	M.	—	—	2 months	Gon., S.o., post. headache, fit; drowsy, attention poor; O.n., L.h.	L. hemiplegia, perma-nent; improved in other respects
10	L. supramarginal; dura excised	M.	—	8 years	—	S.o., fits; alexia, agraphia, amnesia; V.a. $\frac{6}{18}$, O.n., R.h.	"Can do a little work" no paralysis, cannot read, V. good
11	L. post-central; exploratory incision	F.	—	8 years	—	S.o., 1 fit; V.a., R. $\frac{6}{12}$, L. $\frac{6}{6}$, O.n. + 4D.	No symptoms after save defect of sight re-ferable to choroiditi
12	R. lower central; dura and cortex excised deeply	F.	2 months (?)	—	—	S.o., fits, L. face, vertigo; V.a. $\frac{6}{9}$, O.d. normal at first, blurred later, L.h. spastic	Left considerably improved; died at hom
13	R. pre-central; dura and cortex excised deeply	M.	—	—	2½ months	S., fits, beginning L. mouth and face; V.a., R. $\frac{6}{24}$, L. $\frac{6}{12}$, O.d. normal, L.h.; no improvement after 10 weeks' treatment	Left practically well

TABLE I.—GUMMA CEREBRI. PACHYMENINGITIS. OPERATIONS—(*continued*).

No.	Region and nature of operation	Sex	Died after	Alive to date	No reply after	Before operation	After operation
14	L. cerebellum; dura excised	M.	$2\frac{1}{2}$ years	—	—	S.o., headache severe, reeling gait, dull; V. failing, O.n. + 5D.; paral. L. motor 5th and 7th n.	Left practically well; died $2\frac{1}{2}$ years after of nephritis; P.m., L. lobe destroyed; no cerebellar symptoms since operation
15	Left occipital and cerebellum; gummata excised	M.	—	$5\frac{1}{2}$ years	—	S., 3, fits, with colour spectra, anosmia; V.a., R. $\frac{6}{10}$, L. $\frac{6}{15}$, O.n., R. hemianopsia	Three operations. Now quite well $5\frac{1}{2}$ years after operation

For details *see* Appendix 1 to 15.

Abbreviations (which also apply to appendix.).—S., syphilitic history. S.o., no syphilitic history. Gon., gonorrheal history. O.n., optic neuritis. O.d., optic disks. O.m., ocular movements. V., vision. V.a., visual acuity. V.f., visual fields. P.l., perception of light. n., nerve.

TABLE I.

This table gives the results of fifteen operations. It will be seen that twelve were performed upon the central region. This may be owing to the precise symptomatology of the motor cortex, rather than to any special vulnerability of that region. But it is possible that the motor area being in the more direct blood-stream both of the middle meningeal and middle cerebral arterial distribution may be more liable to receive infection, and the fact remains that of the forty cases under consideration 50 per cent. presented more or less definite symptoms referable to this region.

Four of the operation cases died, 26·6 per cent., but none of direct post-operative causes. Case 4 died two months after operation of septic meningitis. Case 7, eight months after of acute pneumonia, but the gummatous pachymeningitis had apparently resumed activity four months after operation, for a considerable mass was found post-mortem at the lower right post-central convolution anterior to the seat of operation, which may, however, have been there at the time of operation. Case 12 improved after operation, but died at home two months after; it is not known under what circumstances. The glioma-like condition of the subcortex in this case will be considered later. Case 14 died at home, two and a half years after, of nephritis, and though the left cerebellar lobe was found to have been destroyed, he had presented no cerebellar symptoms since operation. It would appear then that the mortality in operations on syphilitic lesions is low.

Of those who survived replies have come from four only. One of these, Case 3, has been in hospital quite lately, three and a half years after; he has had two salvarsan injections with benefit. His principal complaint is continual noise in the head; he is mentally rather feeble and wanting in initiative, having been originally a bright, active man, but there are no objective signs. Case 6 is alive seven years after, able to do some light work, but hemiplegic and liable to fits. Case 10 is alive, eight years after extensive excision of membranes and cortex of the left supramarginal region, able to do light work, but still has alexia, and is only able to sign his name: symptoms he had before operation. Case 11, an exploratory incision of the left post-central region, through milky-white membranes, is still alive eight years after, with no symptoms except those referable to choroiditis, which is improving under treatment at an ophthalmic hospital.

No reply has been received from the remaining seven survival cases, but one was known to be alive two years, and another one year after, and in good condition. The state of the remainder can only be inferred from that in which they left hospital.

On the whole it may be said that most of these "no reply" cases were improved, five markedly so; two were hemiplegic from operative disturbance of the motor cortex.

The results of operations then are on the whole satisfactory. Practically all these patients were treated before and after operation by antisyphilitic remedies, and it is not improbable that such treatment becomes more effective after removal of part or all of the meninges affected, which may be regarded as a centre of infection. In some of the cases the cortex was removed with the adherent membranes, and found on examination to be little if at all affected. In Case 5, for instance, who showed before operation some paralysis of the left arm only, but was permanently hemiplegic after. It would seem to be advisable to leave the cortex untouched in all cases, even if it should appear to be infected. With the removal of the membrane the surgeon has done all that can reasonably be expected; excision of the cortex is of uncertain benefit, and may result in permanent disability.

Table II.

These cases were all treated medically only. They all presented localizing signs or symptoms, more or less evident, or the situation of the lesion was verified after death. The regions indicated were in four frontal, six central, one temporo-sphenoidal, three cerebellum, one crus cerebri, one multiple gummata, four foci found post mortem.

Five died, or 31·2 per cent.: Three at home after periods varying from six to twelve months, from admission and treatment, two in hospital, and therefore verified post mortem.

Of those that survived six report themselves as being quite well to the present date, at periods after treatment varying from five months to five years, averaging 34·5 months; three have not replied, but on discharge were practically well. Therefore nine cases, or 56·2 per cent., may be said to have been successfully treated. Two derived no benefit, but of these one, Case 28, cerebellar lesion, is still alive five years after, and reports that, though he was better at first, he soon relapsed to a worse state than before treatment. The other, Case 30, became insane five weeks after treatment.

A glance at the short analysis of symptoms in Table II, before treatment, suffices to show how serious in many cases they were. In only one were the optic disks normal. All the others had more or less severe optic neuritis, and in several the visual acuity much diminished. In the three frontal cases which recovered there were grave mental changes; slow, dull cerebration, in one phases of melancholia, and in another verbal amnesia. In the central cases there were paralyses of one limb, or hemiplegia, more or less severe, which disappeared after treatment. Only one of the three cerebellar cases showed lasting improvement, Case 29, a woman, who gave no syphilitic history. On admission she presented left nerve deafness, visual acuity in R. $\frac{6}{24}$ and complete blindness, left with optic atrophy, left hemiparesis and reeling gait. After treatment the vision improved to R. $\frac{6}{9}$, L. $\frac{6}{18}$. She reports five years after that she is in good health, has since married, has had no children, but two miscarriages. The improvement in vision is maintained and she can see to read.

A frank history of syphilitic infection was obtained in seven cases only; two admitted gonorrhœa, but denied syphilis. No history of infection was forthcoming in seven, but one had had many miscarriages. As to sex, twelve were men, twenty-four women.

TABLE II.—REGION LOCALIZED. MEDICAL TREATMENT.

No.	Region	Sex	Died after admission	Alive to date	No reply	Before treatment	After treatment
16	R. frontal	M.	—	2⅓ years	--	S.; cerebration, memory poor, melancholic phases; V.a., R. $\frac{6}{18}$, L. $\frac{6}{20}$, O.n. + 5D., L.h.	At work, no paralysis, V. good
17	L. frontal	M.	—	—	1 month	S.o.; cerebration, smell and taste defective; V.a. R. $\frac{3}{60}$, L. $\frac{3}{36}$, O.n. intense	Great improvement; V.a., R. $\frac{6}{9}$, L. $\frac{6}{9}$; self discharged
18	L. frontal	M.	—	—	6 months	S.o.; memory poor, verbal amnesia; V.a. $\frac{6}{6}$, early O.n., R.h.	Quite well in 6 months
19	R. frontal (?)	M.	6 months (?)	—	—	S.; depressed, severe constant headache frontal; V.a., fingers at 1 ft., V.f. constricted	Improved at first; readmitted and discharged 5 months after, no improvement; died since, when (?)
20	R. central	F.	--	5 months	—	S., 6 fits, paresis L. arm; V.a., R. $\frac{6}{24}$, L. $\frac{6}{36}$, O.n. early	O.n. subsided in 5 weeks, quite well 5 months after
21	R. post-central	M.	—	3 years	—	S., convulsions L. arm; V.a. $\frac{6}{6}$, O.n.	O.d. normal, quite well, in full work 3 years after
22	R. central	M.	—	4½ years	--	Gon. only; L.h., V.a., R. $\frac{6}{6}$, L. $\frac{6}{6}$, O.d. normal	Complete recovery, no paralysis, at work
23	R. post-central	M.	—	—	2 months	S.; V.a. $\frac{6}{36}$, intense O.n. + 3D., L.h. spastic	Great improvement, hemiplegia less, O.n. subsiding, gait almost natural
24	L. post-central	M.	8½ months	—	—	Gon. only; cerebration slow, emotional; V.a., R. blind, L. $\frac{6}{18}$, O.n. R. + 5·5. L. + 3·5D.; paresis R. arm, R. hemi-anæsthesia	Improved greatly in 2 months, then quite blind and "paralysed"; died at home 8½ months after
25	R. pre-central	M.	6 days	—	—	S.o., fits repeated; L.h., V. failing; status epilepticus on admission	P.m. R. fronto-parietal dura, thick and opaque, and strongly adherent
26	L. temporo-sphenoidal	F.	12 months	—	—	S. (?); many miscarriages, irritable, Witzelsucht; V.a., R. $\frac{6}{12}$, L. $\frac{6}{18}$, O.n.; tremor R. hand	Improved only as to headache; died at home; convulsions before death
27	Multiple gummata	M.	2 hours	—	—	S.o.; 7 d. headache, giddy, gait unsteady; proptosis, double ptosis, comatose. Early O.n.; L.h. spastic	P.m., general pachymeningitis, 4 gummatous foci
28	Cerebellum	M.	—	5 years	—	S.o., denies risk; V.a., R. $\frac{6}{18}$, L. $\frac{6}{9}$, choroidal changes lower retina detached, R. ptosis, R. L. Lat. deviation; paralysed, gait reeling	Eye symptoms improved very much at first, now "eyes fixed," can only creep about, generally worse
29	L. cerebellum	F.	—	5 years	—	S.o.; L. nerve-deafness, R. anosmia; V.a., R. $\frac{6}{24}$, L. P.L., Opt. atrophy, L.h.; gait unsteady	Great improvement; V.a. R. $\frac{6}{6}$, L. $\frac{6}{18}$, [illegible] married, 2 miscarriages; no paral., [illegible] opt. atrophy, can [illegible] to read

TABLE II.—REGION LOCALIZED. MEDICAL TREATMENT—(*continued*).

No.	Region	Sex	Died after admission	Alive to date	No reply	Before treatment	After treatment
30	L. cerebellum and pons	F.	—	—	5 weeks	S. husband; post. headache and vomiting, anosmia, agustia, blind; Opt. atrophy, Paral. L. 5, 6, 7 n.; gait reeling	No improvement, became unmanageable, insane
31	L. crus cerebri	M.	—	2 years	—	S.; depressed, memory poor, V.a. $\frac{6}{10}$, early O.n., L. 3rd n. paral., R.b.; Wassermann positive	Improved, no hemiplegia, V.a. as before, readmitted 6 months after, salvarsan; practically well since

For details *see* Appendix 16 to 31. Abbreviations at foot of Table I.

TABLE III.

This Table includes unlocalized cases in which syphilis was suspected as a cause, perhaps as much by the results of treatment as by history of infection. Any of these might be and probably were diagnosed as cases of tumour cerebri in the first instance and, of course, their recovery after treatment does not necessarily prove gumma. All of them gave evidence of intracranial pressure, varying degrees of optic neuritis and swelling, to post-neuritic atrophy, with more or less severe headache and vomiting in most. Seven of them presented mental aspects suggestive of frontal lesion, and among the symptoms may be included general convulsions and cranial nerve lesions. Syphilitic infection is practically certain in six. As to sex, four were men and five women.

The results after treatment correspond closely with those recorded in Table II, that is, five, or 55·5 per cent., apparently completely recovered, but from only two have come replies, sixteen months and six years after respectively; the remaining three were well on leaving hospital. Two cases improved to such an extent that they might be almost safely included among the recoveries, and two improved but little. No deaths have been heard of.

GENERAL CONCLUSIONS.

Considering the gravity of the symptoms in all these twenty-five cases medically treated, it must be admitted that the results of treatment on the old lines is satisfactory. The method almost universally employed is that of mercurial inunction and potassium iodide 10 gr. to 20 gr. It

TABLE III.—REGION NOT LOCALIZED. MEDICAL TREATMENT.

No.	Region	Sex	Alive to date	No reply	Before treatment	After treatment
32	Gumma cerebri	F.	16 months	—	S.(?): headache and vomiting, convulsive attacks; colour spectra, V.a. $\frac{6}{20}$, O.n. 4D.; Wassermann positive	V. a. improved to $\frac{6}{12}$; two maniacal attacks; now perfectly well
33	Basic pachymeningitis	F.	—	18 months	S.; drowsy, memory poor, vertigo; L. 6, R. 7, n. paralysed, O.n.	O.n. subsided; 6 n. paral. still, otherwise well for 5 months; readmitted with same symptoms; left quite well
34	Gumma cerebri	M.	—	6 weeks	S.; frontal and occipital headache; V. failing, R.H.; incontinence, disoriented; V.a., R. $\frac{6}{20}$, L. $\frac{6}{15}$, O.n., R. ptosis	All symptoms disappeared; left quite well
35	Gumma cerebri	M.	6 years	—	S.; frontal headache and vomiting; V.a. $\frac{6}{6}$, intense O.n., R. +6, L. +4D.; R. L. ext. recti paralysed	Perfectly well 6 years after
36	Gumma cerebri	M.	—	7 weeks	S; disoriented, drowsy, dirty in habits; V.a., R. $\frac{6}{25}$, L. $\frac{6}{10}$, O.n., +4D.; R. ptosis, R. 6 n. paral., R. H.	Improved in all respects, but optic disks still obscured at time of discharge
37	Gumma cerebri	F.	—	1 month	S.o.; many convulsions, memory poor; V.a., L. blind; severe constant post. headache; O.d. post-neuritic atrophy	Slight general improvement
38	Gumma cerebri, L. temporal(?)	F.	—	7 weeks	S. o.; 14 childr., 4 d. convulsions, 1 misc.; many fits, amnesia verbalis, anosmia; V.a., R. $\frac{6}{18}$, L. $\frac{6}{12}$, O.n.	Headache and speech improved; very emotional and religious
39	Gumma cerebri, frontal (?)	M.	—	6 weeks	S.; apathetic; V.a. $\frac{6}{9}$, O.n., +4D.; paresis, R. and L. 6 n.; fine tremor both arms, sudden falls	O.n. completely subsided, improved
40	Gumma cerebri	F.	—	7 weeks	S.; V.a. $\frac{6}{9}$, O.n. early	Great improvement; O.n. subsided

For details *see* Appendix 32 to 40. Abbreviations at foot of Table I.

is doubtful whether better results can be expected from the use of salvarsan, and an analysis of cases treated by this method, in comparison, some years hence, will be awaited with interest. These results also emphasize the importance of treating every case of apparent tumour cerebri, for a period, by anti-syphilitic methods, unless, of course, the symptoms become progressively urgent. The improvement is often rapid and more or less decisive in a week or two, and if not urgent the case is in no way prejudiced by such a procedure. If the patient makes no progress under this treatment, and still a syphilitic infection is suspected, whether or not confirmed by the Wassermann method, operation with removal of the affected membranes is advisable. Thus an active centre of infection may be removed, and a decompression effected. It may also be expected that continued anti-syphilitic treatment may be enhanced in its effects.

"Cerebral Syphilis."

There remain for consideration thirty-one cases falling in the indefinite category of "cerebral syphilis." They are difficult to analyse collectively, but the main features may be summarized as follows: As to sex, twenty-two were males and nine females. A frank history of syphilitic infection was obtained in eighteen, one only of which was a woman. Two cases were congenital. In eleven cases syphilis was suspected, but no direct history obtained. Among the predominant symptoms may be mentioned the following: Headache and vomiting in nine; mental symptoms in sixteen, mostly dullness and slow cerebration; convulsions in nine cases; cranial nerve lesions in twelve cases, nearly all of third and sixth nerves; optic neuritis in only one; optic atrophy in four; some degree of paralysis in limbs in nine cases. Decompression operations had been performed in two cases, but with doubtful benefit; one cannot be traced.

As regards results of treatment, thirteen were decidedly improved at the time of discharge, but most have not been traced. Six were discharged as quite well after treatment, and two of these have reported themselves as quite well to date, seven and a half and eight and a half years after. In addition to these last two cases, replies have come from only four, at periods varying five to eight and a half years after. One is hemiplegic but able to get about, another has fits rarely, but many minor attacks, another has little more than dragging of the left leg, but says he can do no work, and the last has since become quite blind. Three have died: one in hospital, with multiple thrombosis of cerebral vessels, and spinal lepto-meningitis, and the other two outside. Eight left hospital in much the same condition as on admission, and not having replied their present condition is unknown; and of one case no note as to condition is recorded.

The pathological conditions in these cases are probably various, but no doubt in all there is more or less syphilitic lepto-meningitis, but of a diffuse nature, and often basic. Vascular lesions with interference of blood supply also probably contribute largely to the symptomatology. Ultimately, chronic sclerotic cortical changes similar to those in general paralysis may become established.

THE HISTOLOGICAL FEATURES OF SYPHILITIC AFFECTIONS OF THE MENINGES AND BRAIN.

Operations involving excision more or less deeply of the dura mater, pia arachnoid, and in some cases the underlying cortex and subcortex, have afforded the opportunity of examination of these tissues in eleven cases. The sections have been stained as a rule by the ordinary hæmatoxylin and eosin, or Van Gieson methods. Pappenheim's nuclear stain for showing the distinctive character of plasma cells had not been employed in any of the sections.

General Characteristics of Gummatous Inflammation.

It is difficult to say what are the truly specific features of a syphilitic lesion. Inflammation, active or chronic, with fibrosis as its ultimate result, is the basis of the process. And yet the characters of this class of lesion are sufficiently easy of recognition. For with what similar lesion is it likely to be confused? Two only: (1) Inflammation spreading from neighbouring structures, such as the ear, the sinuses, or the bone, or inflammation due to septic emboli, and neither of these could offer any great difficulty of diagnosis; (2) tuberculous infection, which again presents fairly distinct characters of its own.

The more distinctive characters of syphilitic inflammation within the cranium may be conveniently considered under the following heads:—

(1) *Active Gumma in its Earlier Stages.*—Though foci may develop independently in any part of the brain, the commonest seat of activity, by far, is in some part of the membranes, and practically always in the pia arachnoid. The form is essentially inflammatory in the first instance (fig. 1). Masses of leucocytes are thrown out widely, but mostly aggregated around the cerebral vessels of all calibres, in their perivascular spaces, and tending to spread along them down into the cortex and more deeply into the white matter (fig. 1).

At the same time, or later, there appear plasma cells in large numbers in the neighbourhood of the inflammatory foci and among the leucocytes. These are cells some two or three times the diameter of the leucocytes, well defined, but taking the ordinary stains less deeply, generally ovoid or irregular, with nuclei placed excentrically at one pole of the cell. The nuclei have generally a clear space around them and present by Pappenheim's methyl green and pyronin stain a peculiar "cart-wheel" appearance (fig. 2). By ordinary staining reagents these nuclear peculiarities are not shown, but the cells themselves can be seen without difficulty in most active gummata.

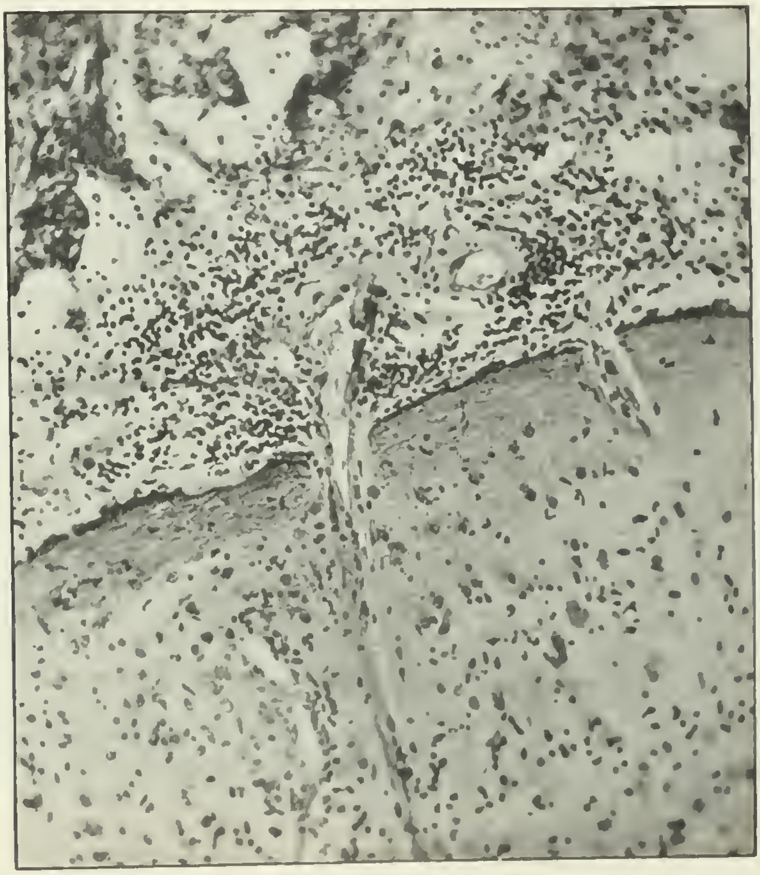


FIG. 1

Case 4. Right post-central, dura and cortex partially excised. Died two months after of septic meningitis.

Together with the plasma cells occur elongated fusiform cells, fibroblasts, perhaps a further development of the plasma cells, shown also in fig. 2. These no doubt form the basis of the fine reticulum which is the early supporting structure of the newly formed tissue of the gumma, and later of the coarse fibres and ultimate scar-like tissue of the so-called pachymeningitis. Though these cells so invariably occur in the early developing gumma that they may be considered one of the distinguishing features as opposed to other inflammations, yet they are not peculiar to this class of lesion, but occur wherever new tissue is in the process of formation. In rapidly growing gummata are sometimes to be seen giant cells, masses of protoplasm containing many cells within them, not so definite in their histological characters as those of tubercle, but somewhat resembling them. These again are not specific of gumma.

Blood-vessels.—The changes in the blood-vessels are more definitely characteristic of syphilis than any other. A swelling and proliferation of the endothelium of the small vessels and capillaries may occur, but this does not seem to be a common appearance in gumma, it has only been found in this one case of this series. It is almost invariable in the active gliomata, in which great proliferation and ultimate closure of the lumen is so striking a feature. The characteristic changes have their origin in the intima, that is, internal to the well-marked elastic lamina. The earliest evidence of this lesion is a leucocytic invasion in this situation. The inflammatory focus is generally to one side, the

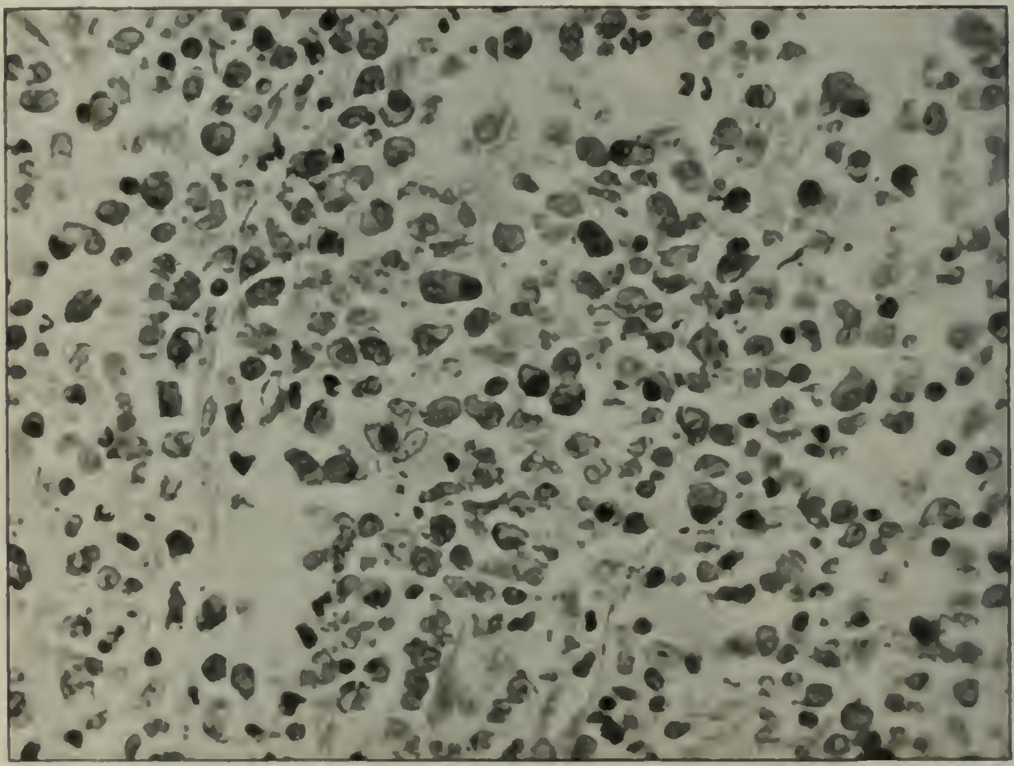


FIG. 2.

A section of a gumma of the tongue (kindly lent by Dr. Andrewes). Plasma cells of all shapes; a typical cell is seen slightly above, and to the left of, the centre. Fusiform fibroblasts also shown faintly stained.

intimal coat becomes invaded and thickened at the expense of the lumen of the vessel, which may ultimately become obliterated as in fig. 3, Case 6: a right post-central gumma excised with underlying cortex. Though the intima is the specific seat of the lesion, the elastic lamina may be locally destroyed and the middle coat thinned from within, and also by periarterial invasion from without, as is shown in this figure. With a higher power can be seen plasma cells, fibroblasts, and in fact all the characters of a small young gumma. By the organization of the focus the intima is permanently thickened, and the familiar features of syphilitic endarteritis obliterans are established. In all active gummata, as in gliomata, there is strong tendency to massive necrosis of the new tissue. Areas appear having lost or losing all distinctive features, staining feebly by all ordinary reagents, the cellular elements undergoing chromolysis. The cause of necrosis must be thrombosis of vessels, as is shown so strikingly in the gliomata.

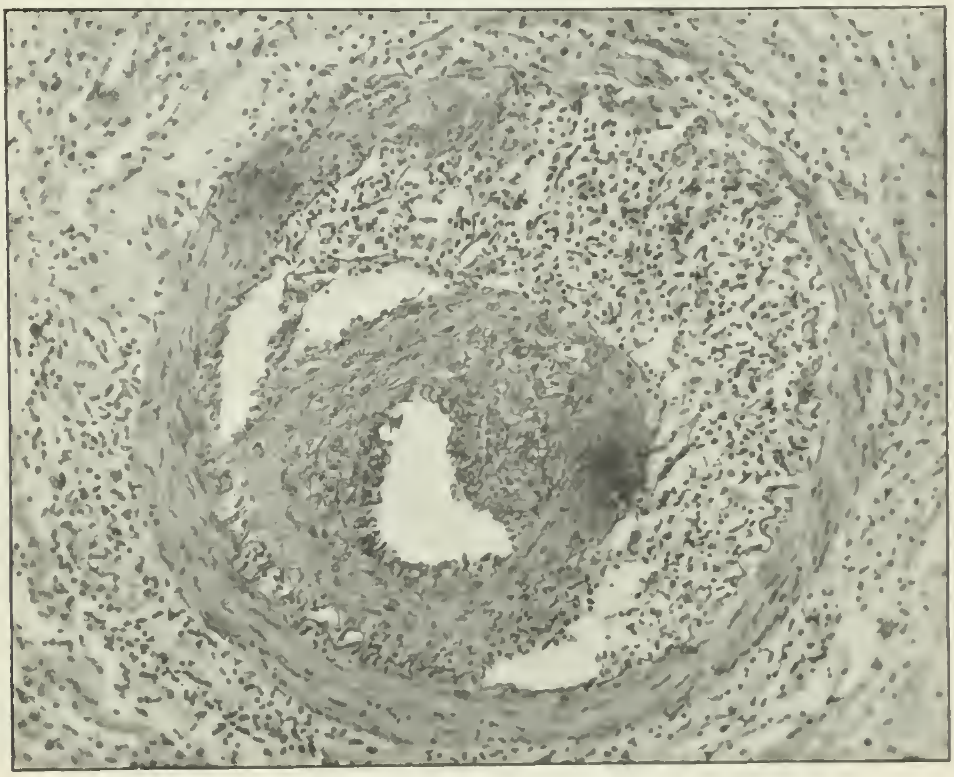


Fig. 3.

Early syphilitic endarteritis. Leucocytic invasion of intima internal to elastic lamina.

(2) *Chronic Pachymeningitis.*—The appearance of activity described above may subside. The membranes now present the appearance of

fibrosis. The reticular network of the active gumma develops into thick fibres, becoming more and more condensed, still perhaps showing leucocytes within their inter-spaces, but the plasma cells of the active growth have disappeared. The fibrotic mass may be closely adherent to the cortex, which may be little altered, or may itself be sclerosed. The dura mater itself is also sometimes enormously thickened. If this mass of quiescent tissue is situated over a so-called "silent area" of brain, it may give no further evidence of its existence, but if it happens to lie over an excitable area it may give rise to pareses or epileptic discharges.

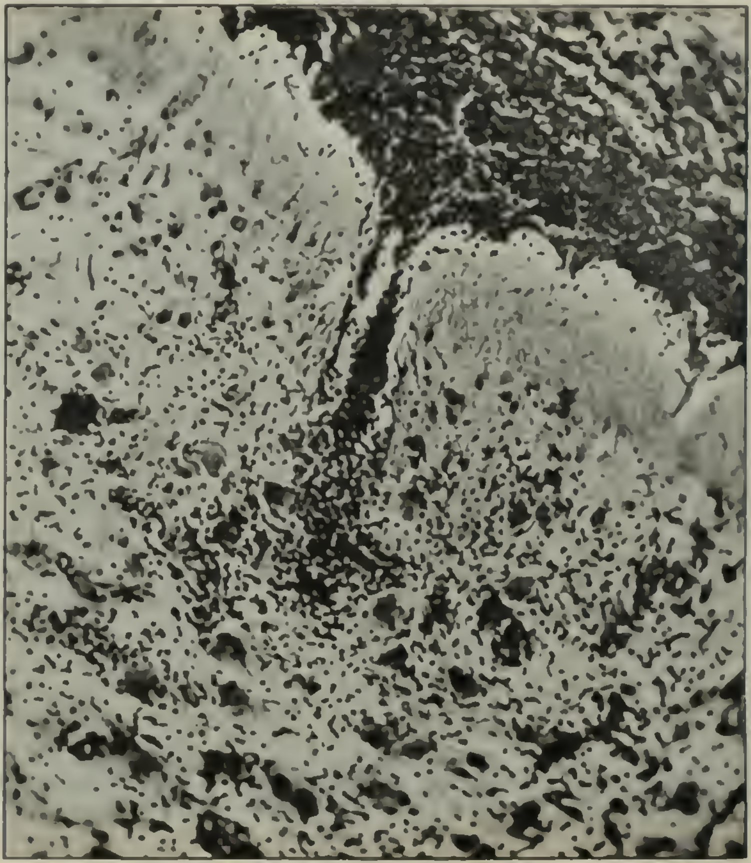


Fig. 4.

Case 6. Proliferation of glia cells of cortex in the neighbourhood of a focus prolonged from the meninges, which are the seat of gummatous lepto-meningitis.

(3) *Effects on Underlying Brain.*—Seeing that the centres of infection are about the ramifications of the cerebral vessels, it is remarkable how little the cortex suffers in some instances. A slight invasion of leucocytes scattered about the section, with no visible alteration of the cortical structures, may be all that is seen, as in fig. 1. But generally patches

of inflammation found about the entering vessels are the commonest indication of cortical affection, and these may be seen deep down in cortex and white matter, forming apparently independent centres, a very common appearance. Further, the cortex may lose all its distinctive features and be the seat of a true gummatous mass, in which necrotic areas may be found.

But another interesting effect of invasion of the cortex is shown in fig. 4, Case 6: a right post-central gumma which was excised with the cortex. The patient had suffered from local convulsion of the left arm, and had made no improvement after two months' treatment medically. The result was persistent left hemiplegia and occasional fits, but he is alive seven years after, and able to do light work. Here is shown a direct prolongation of the inflammation along a vessel, with a general leucocytosis of a part of the cortex. There is also a marked increase and swelling of the glia cells, without, however, proliferation of their nuclei. This effect is not uncommon in other cases in the presence of leucocytic invasion. The appearance is strikingly like that of a glioma.

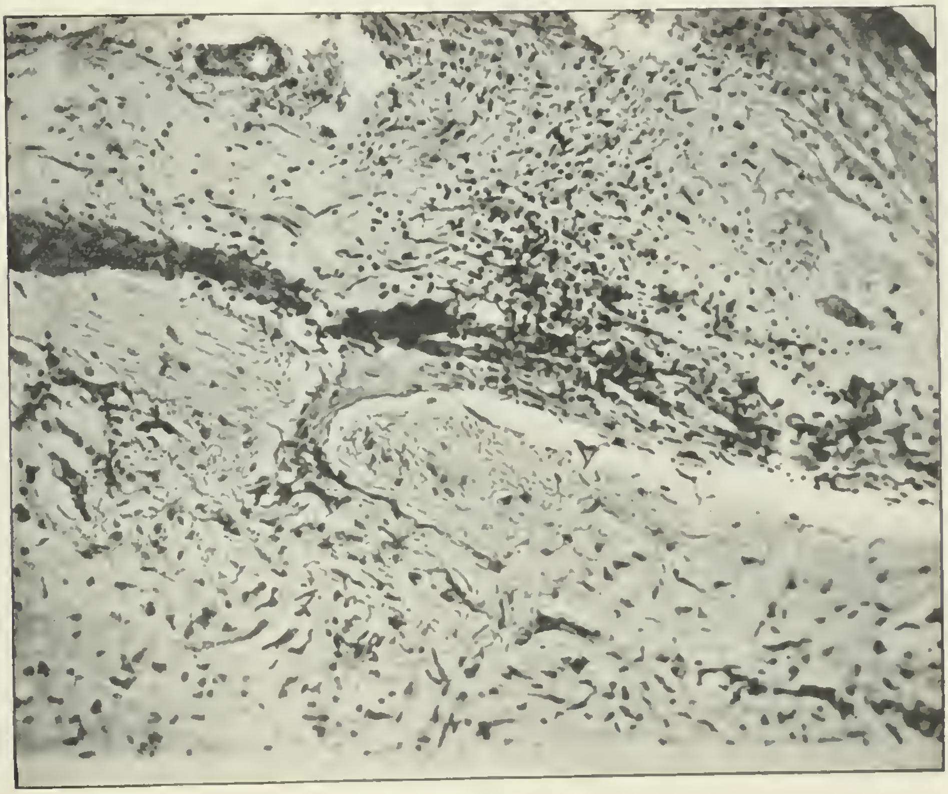


Fig. 5.

Case 12. Meningeal gumma, upper half of figure; cortex, lower half, somewhat disorganized and sclerosed.

Another instance is found in Case 12 (figs. 5 and 6), a right lower central gumma, which was excised with cortex and subcortex. Before operation there were convulsions beginning in the left face, and left spastic hemiplegia. The patient generally improved, but died at home some time after.

Fig. 5 includes a part of the gummatous meninges and the superficial cortex which is disturbed, but shows no active changes. Lower down in the cortex there is slight leucocytic invasion, but a quite normal condition of the pyramidal cells. Fig. 6 is taken from lower down still, in the white matter, and the appearance is that of a glioma of quite a quiescent type, and if taken without the context would surely be considered to be one.

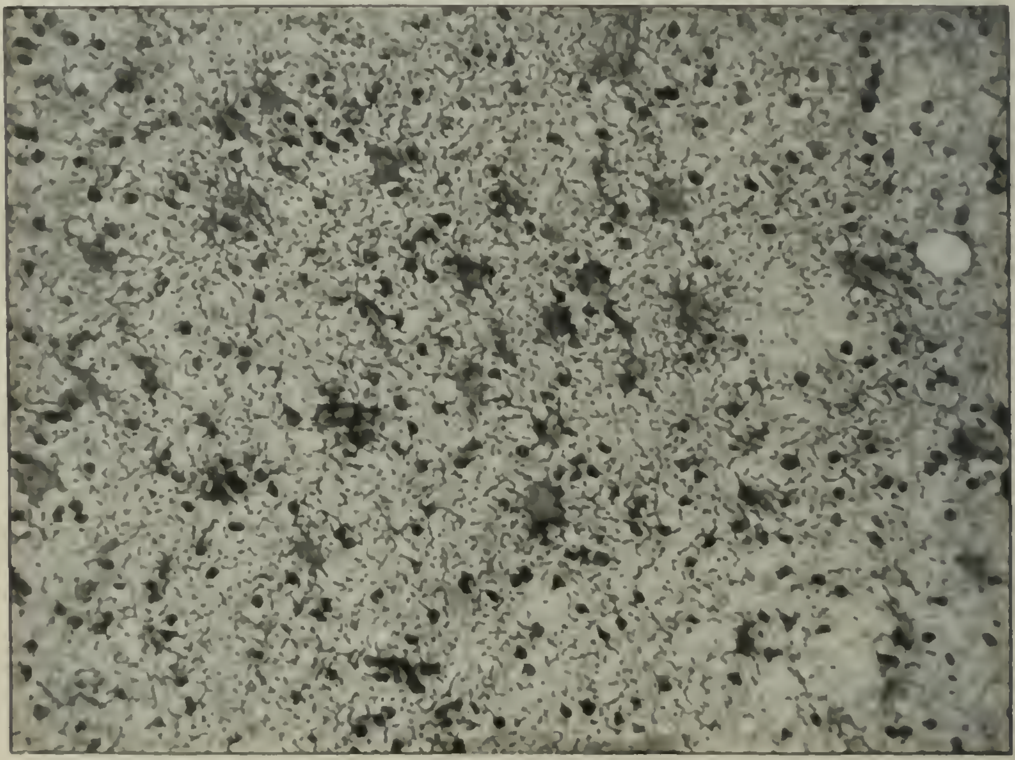


Fig. 6.

Case 12. Subcortex showing characters typical of glioma.

A more striking instance even is seen in Case 13 (fig. 7). A right precentral gumma, deeply excised with cortex and subcortex. There was a history of syphilis, fits beginning in the left mouth and face. The patient left hospital with some weakness of the left face and arm, otherwise practically well. The section, not figured as a whole, shows an enormous thickening of the dura mater itself, and also characteristic gummatous inflammation of the pia-arachnoid. There is much inflammatory disturbance of the cortex, but the subcortical white matter (fig. 7) shows extensive and typical appearances of glioma formation, the fine reticulum, the small cells scattered about the field, and the large glia cells in considerable numbers, swollen and taking the stain deeply.

It is evident then that one effect of a syphilitic inflammation is to give rise to active changes in the glia structure. This circumstance seems to throw a sidelight on the pathogenesis of the gliomata. The extraordinary active proliferation of glia and vascular elements in glioma strongly suggest some irritative cause, perhaps of an infective nature, which has at present eluded observation. Apparently one of these irritative causes is syphilitic inflammation; there may be others. The life-history of the glioma is suggestive of this. The long periods of latency, activity, intolerance of interference, all seem to point to some infective origin.

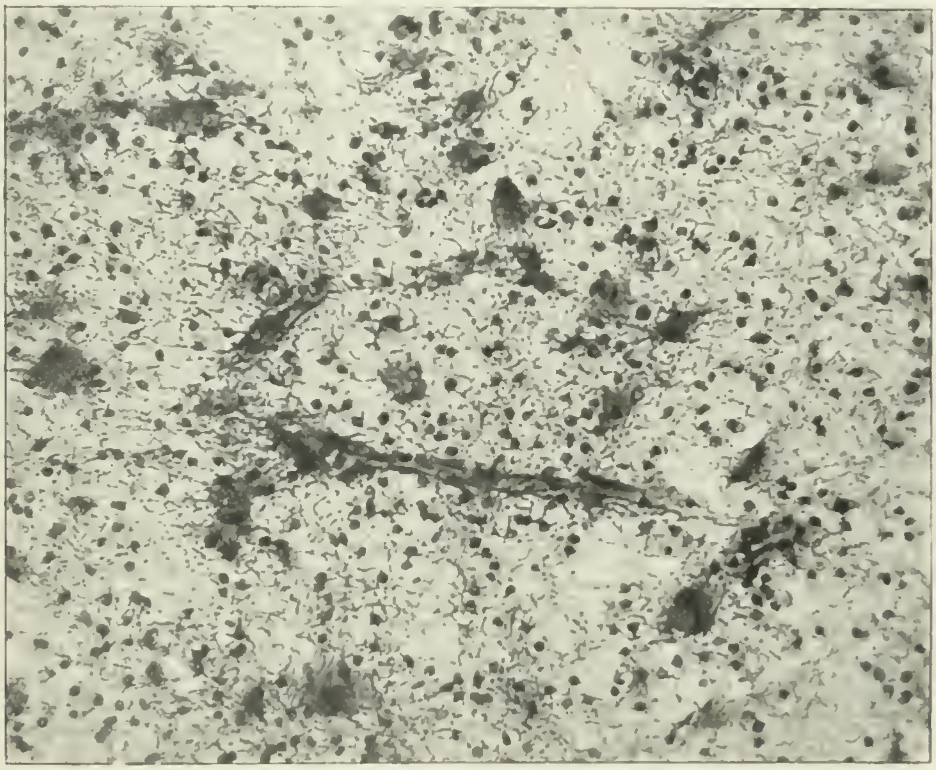


FIG. 7.

Case 13. Subcortex, histological characters typical of glioma.

APPENDIX.

ABSTRACT OF CASES REFERRED TO IN THE TABLES.

Abbreviations as at foot of Table I (p. 89).

(1) R. frontal. A. A., man, aged 39 (Sir W. Gowers, Sir Victor Horsley). *Hist.:* 18 yrs. a general convulsion, bit tongue and passed water. Soon after this had syphilis, and 6 mos. after was in Bethlem Hospital for 6 mos. Fits at irregular intervals ever since, preceded by mental confusion, verbal amnesia, and numbness of L. face; 15 mos. continual R. frontal and vertical headache; temporary amaurosis of R. eye and later of L.; 4 mos. limbs weak; 3 mos. vomiting every morning. *On adm.:* Dull, depressed, memory and attention poor. V.a.: R. fingers at 6 ft., L. $\frac{6}{6}$. V.f.: R. concentric diminution of field. O.d.: R. atrophy, L. pale, outer third. Slight L. hemiparesis. *Operation:* R. frontal; 2nd stage 5 days after 1st, irregularly shaped tumour removed from R. frontal lobe. It lay just under the cortex and was easily removed. Exact measurement and situation not recorded but size of section ¾ in. diam. *After:* No bad symptoms; wound healed; 5 wks. after, flap depressed; mental condition improved; no paralysis; gait natural. In hospital 74 days. *No reply* to inquiries.

(2) L. precentral. J. A., man, aged 27 (Dr. Taylor, Sir V. Horsley). No hist. S. or gon. *Hist.:* 4 mos. fit, gen. conv. preceded by sensation of hair in mouth, and unable to express himself; 6 mos. tinnitus R. L.; headache occasional. *On adm.:* Scars of abscesses L. leg and breast; intelligence, memory, attention good. V.a.: R. $\frac{6}{6}$, L. $\frac{6}{5}$. O.d.: late stage optic neuritis + 5D. swelling; one local fit observed, R. arm, head and eyes to R.; no loss of consciousness. *Treatment:* Potass. iodide 15 gr., ung. hydr. for 12 d., then operation. *Operation:* L. front. parietal; 1st stage, no note; 2nd stage, dura thickened and adherent, pressure raised. A mass 1 in. by 1½ in. by ½ in. thick on inf. precentral convol. removed fairly easily, except near Sylvian fissure, where it was adherent, proved to be gummatous pachymeningitis. *After:* R. facial weakness; anarthria 2 d. after; can say "yes" and "no"; slight R. hemipl.; aphasia recovered almost completely; 13 d. O.d.: R. + 6, L. + 7; optic neuritis more marked L. *No reply.*

(3) L. central. R. F., man, aged 43 (Sir W. Gowers, Mr. Armour). Syphilis at the age of 19. *Hist.:* 2 years drowsy, headache, nausea, 20 mos. fit, general convulsions; 18 mos. R. foot dragged; soon after admitted St. Mary's Hospital comatose for 14 days; 16 mos. twitching attacks R. great toe, foot and leg, later spreading to R. shoulder, elbow and hand; later R. hemiplegia; 14 mos. unable to walk. Treated at West End Hospital, almost completely recovered. Attacks very infrequent since, but 4 mos. another, and since then progressive weakness R. leg with L. fronto-parietal headache. *On adm.:* Very intelligent. O.d.: Normal. The physical examination shows no abnormality. *Operation:* 9 days after; L. parietal, exposing upper central region; dura thick, yellow, over area exposed 3 in. by 2 in. incised, found to be adherent to pia which was thickened. A nodule the size of a split pea was embedded in the upper precentral cortex. This with most of the dura was removed. *After:* Slight weakness R. arm and foot; next two days 3 fits; 2 mos. after, no more fits but slight twitches, rarely, of R. great toe. Left hosp. 69 d. after operation apparently quite well. *Readmitted* 6 mos. after operation; many "sensations" of subjective numbness below R. knee; 3 general convulsions; improved after a month's treatment. *Reply*, 3 yrs. after. Memory poor, unable to work, but can get about; gait a little stiff; vision fairly good; no bulging of wound; fits, 6 in all; sensations in R. leg as before; headaches very frequent and severe; continual hissing noise in head. About 18 mos. after operation had a dose of salvarsan and was much better after it. *Readmitted* August, 1912, still complaining of continual noise in the head; improved again after another dose of salvarsan; mentally rather feeble and wanting in initiative.

(4) R. post-central. F. P., man, aged 45 (Sir W. Gowers, Mr. Ballance). Gonorrhœa 16 yrs.; syphilis denied. *Hist:* 2 yrs. fell down ship's hold, unconscious 8 hrs. 3 wks. after: L.-sided fits 3 a wk., beginning in L. leg; vision failing; throbbing headache. *On adm.:* Intelligence, memory and attention all very defective; double optic neuritis, with

+ 3D. swelling; slight L. hemiplegia, with hemi-anæsthesia, astereognosis, and pre-axial atopognosis; reflexes, deep, upper L. brisker than R.; abdominal L. absent; plantar L. extensor; had 4 fits during one month in hospital before operation. *Operation:* R. parietal; osteoplastic; dura under pressure; incised. A grey, purplish tumour, irregular and nodular, invading the post-central cortex was found, and a small piece incised. *2nd stage:* The tumour was removed in pieces, weight 84 grm. *After 1st stage:* 4 fits, as before. *2nd stage:* Optic neuritis subsiding to pallor; 6 days after no marked bulging, general condition excellent; no hemiplegia now; 19 days temp. rising to 103° F.; stuporose; hemiplegia returning; died 2 mos. after operation. *P. m.:* Gumma occupying R. central and post-central, some removed; septic meningitis.

(5) R. central. W. S., man, aged 36 (Sir W. Gowers, Sir V. Horsley). Syphilis in Burma, when? *Hist.:* 18 mos., blow on R. parietal region; 15 mos. severe headache and a large lump appeared over site of injury; 6 mos. L. arm numb and weak, followed by general convulsions; 1 mo. attack of twitching L. arm; much mental change, amnesic, passionate, threatening suicide; 3 wks. V. failing; L. arm paralysed; later a L.-sided convulsion. *On adm.:* Memory and attention very poor; drowsy; double optic neuritis; distal paresis L. arm, with atopognosis and astereognosis L. hand, also much apraxia: loss of sense of position and joint sense. Cranium, an area of bone defect, diameter 1 in.; 4 in. above auditory meatus, no positive pressure. *Operation*, 8 days after admission: R. parietal; skull a mass of syphilitic osteitis round about perforation; underlying dura infiltrated by caseous matter. *2nd stage*, 7 days after: Dura cut round adherent area; cortex appeared natural; dura removed and cortex to depth of $\frac{1}{4}$ in. *Pathological appearance:* Cortex œdematous, otherwise healthy; meninges thickly fibrous; vessels very little affected, no great perivascular nucleation, no thickening of walls. *After:* Complete L. hemiplegia; discharged 3 mos. after. *No reply.*

(6) R. post-central. G. M., man, aged 42 (Dr. Beevor, Sir V. Horsley). No history of syphilis. *Hist.:* 4 mos. sudden paralysis and numbness of L. hand, convulsion of arm, then leg and face for $\frac{3}{4}$ hr.; 11 similar attacks to date of admission. *On adm.:* Mental condition and cerebration natural. V.a.: R. $\frac{6}{5}$, L. $\frac{6}{6}$; double optic neuritis with + 3D. swelling; slight hemiplegia and hemi-anæsthesia, with atopognosis and astereognosis; cranium, tender area R. parietal. After 2 mos. treatment the optic neuritis becoming more marked, operation was decided upon. *Operation:* R. parietal; bone very vascular; dura red and roughened over post-central region. *2nd stage*, 7 days after: Dura very thick, evidently syphilitic pachymeningitis (confirmed microscopically), soft, yellowish-grey, adherent to cortex; in places small nodules, size of an almond, pressing upon, but not adherent to, cortex; mass removed with underlying cortex. *After 2nd stage:* L. hemianopsia; more weakness of L. arm, but leg not altered; sensory symptoms as before; optic neuritis in 5 days quite subsided; is attending as out-patient 7 yrs. after operation; able to work selling papers; has fits occasionally; L. hemiplegia with much sensory loss.

(7) R. central and post-frontal: W. M., man, aged 42 (Sir W. Gowers, Sir V. Horsley). Syphilis 20 yrs.; no children. *Hist.:* 4 mos. general convulsions beginning with sensations in L. fingers and up arm; two more fits next two months; 12 mos. constant headache for a month; 8 mos. morning vomiting; recent L. hemiplegia. *On adm.:* Dull and apathetic; memory and attention poor. V.a.: R. $\frac{6}{18}$, L. $\frac{6}{6}$; gross optic neuritis with + 3D. swelling; divergent strabismus: flaccid L. hemiplegia and anæsthesia; cranium, tender over R. temporal ridge. At first some improvement, brighter mentally, relapsing in the course of a month. *Operation:* R. frontal craniectomy 3 in. square; dura tense, some considerable hæmorrhage. *2nd stage*, 7 days after: Tumour mass found posterior 2nd and 3rd frontal convolutions; cortex softened round it; easily removed, firm, irregular, of size of walnut, extended nearly to fissure of Sylvius; microscopically, gummatous pachymeningitis. *After 1st stage:* No change. *2nd stage:* L. arm paralysis, less of leg; 13 days after mentally bright, wound healed, no bulging; optic neuritis subsiding; 6 wks. after condition good. V.a.: R. $\frac{6}{24}$, L. $\frac{6}{12}$; optic neuritis subsiding to atrophy; hemiplegia and sensory symptoms less. *Readmitted* 8 mos. after; had been going on well up to 4 mos. before readmission, when paralysis increased and sight failed; a small tumour appeared on forehead behind the scar, size of a hazel-nut; fits recommenced. *On adm.:* A large soft hernia; mental condition

dull and cerebration very poor, emotional; temp. fluctuated between 102 and 105 F.: died 15 days after of acute pneumonia. *P. m.:* Softening at seat of operation, and lower part of R. central; small mass of tumour lay at anterior part of softened area; R. middle cerebral artery thrombosed.

(8) R. supramarginal and angular gyrus. J. S., man, aged 45 (Sir W. Gowers, Sir V. Horsley). Gonorrhœa when aged 16; syphilis denied. *Hist.:* 19 mos. general convulsions; 6 wks. later "petit mal" attacks, one or two a day until 3 mos. ago, when he had three severe attacks preceded by vertigo, colour spectra white, blue and red balls in succession, to the L. of the field for one minute, head turned to L. After the last L. hemiparesis for ten days, R. headache and persistent L. tinnitus; speech affected for a few minutes after attacks, and a nasty taste in mouth. *On adm.:* Mentally bright. V.a.: R.L. $\frac{6}{6}$. O.d.: normal. L. hemianopia after a fit. No paralysis. Spelling very defective, though well educated. *Operation:* 7 wks. after admission. R. parietal craniectomy 3½ in. square. Little if any tension. *2nd stage*, 4 days after: Dura rather depressed; pia milky-looking; substance of supramarginal region sclerosed, opaque greyish-white. Incision laying open lateral ventricle, discovered no tumour. A firm patch of sclerosis felt in angular gyrus. Nothing further done. *After 2nd stage:* Next day a fit, left-sided; restless; one or two fits every day, always left-sided, without loss of consciousness, for the next 20 days, when they ceased. There was L. hemiplegia and aphasia, both of which rapidly improved; 2 wks. after wound depressed, bright mentally. One attack only in 6 wks. in which colours were seen, but not the same spectra. Optic disks clear, slight constriction of visual fields. Treatment by potass. iodide and ung. hydrarg. all the time. *No reply*, but known to be alive 2 yrs. after. Case quoted by Sir W. Gowers in his Hughlings Jackson Lecture (*Brain*, xxxii, p. 303).

(9) R. central. J. W., man, aged 33 (Dr. Ormerod, Sir V. Horsley). Gonorrhœa 6 yrs.; no history of syphilis. *Hist.:* 5 yrs. posterior headache, one a month at first, later weekly, with vomiting; 7 days brought home unconscious while at work; attack preceded by numbness L. hand, then paralysis and loss of speech. *On adm.:* Drowsy, repeatedly yawning; no power of attention. Optic disks both blurred; L. hemiparesis distal, and L. hypalgesia. Cranium R. parietal tender to pressure. *Operation:* 11 days after admission, R. parietal. Considerable bulging at *1st stage*. *2nd stage*, 5 days after: Pallor of R. motor area, and great œdema posteriorly to it. Exploratory incision. Finger inserted, probe passed in all directions; nothing found. *After 2nd stage:* Complete L. hemiplegia and hemi-anæsthesia. 12 days after, brighter and more intelligent; no headache, movements returning, but much rigidity; can walk a few steps. Improvement continued, but *no reply* to inquiries.

(10) L. supramarginal. E. M., man, aged 39 (Sir W. Gowers, Sir V. Horsley). No record of syphilis. *Hist.:* 2 yrs. fall on head; 13 mos. temporal headache; 11 mos. general convulsion, another 14 days after, and then at irregular intervals until 7 days before admission, since when two or three a day, faint and giddy then, unconscious without convulsions; 5 mos. speech affected, unable to read or write; 2 mos. memory failing; 6 wks. paresis R. arm. *On adm.:* Understands spoken and written commands, can only "read a line or two," though well educated; hopeless blunders in addition; cerebration slow. V.a.: R.L. $\frac{6}{12}$. V.f.: Restricted temporal side R. eye. O.d.: swelling R. + 2·5, L. + 4D. Slight R. hemiparesis. Slight anæsthesia, and impaired sense of position R. hand. "Petit mal" attacks frequent, followed by increased difficulty in speaking, and R. hemi-anæsthesia. Cranial tenderness L. temporal region above ear. *Operation:* L. post parietal craniectomy, 3 in. + 3½ in.; dura thickened and opaque. *2nd stage*, 7 days after: Dura tense, firmly adherent to subjacent cortex; excised to ½ in. deep; firm, hard mass beneath dura, and below this the brain was softened and yellow, probably down to optic radiations. The mass lay mostly in the supramarginal region. Microscopically, typical gummatous pachymeningitis, perivascular spaces loaded with cells, well into underlying cortex. *After: 2nd stage* borne well; next day wound leaking, mentally depressed; 3 days after, mentally bright and intelligent, no leakage. Paresis R. arm, R. hemi-anæsthesia, complete astereognosis and loss of sense of position; spontaneous speech much improved, but verbal amnesia; 3 wks. after, some bulging of wound; power and sensation returning; optic neuritis and swelling subsiding; 5 wks., o.d. clear almost. Can walk alone. *Readmitted:* 2 yrs. 2 mos. after operation. Has continued in same condition as on discharge, not able to work, but could get about; still

unable to name objects; last 3 mos. two right-sided fits with loss of consciousness; since then vertigo and headache and some increase in hemiparesis. *On readmission:* Wound depressed; mentally stupid, but conscious of it; conversational power limited; verbal amnesia still. V.a.: R.L. $\frac{6}{6}$. V.f.: R. hemianopsia. R. hemiparesis and anæsthesia. Remained in hospital 44 d. without much improvement. *Reply* from wife: Can do a little work, standing outside a shop, and can get about; no paralysis; vision quite good; cannot read, and can only write his name.

(11) L. post-central. C. D., woman, aged 40 (Sir D. Ferrier, Sir V. Horsley). *Hist.:* 2 yrs. R. occipital headache paroxysmal, latterly general; 2 mos. a fit, lost consciousness, tongue bitten, legs rigid; 1 mo. giddiness when attempting to walk. *On adm.:* V.a. R. $\frac{6}{12}$, L. $\frac{6}{9}$. Optic neuritis with R. + 3·5, L. + 4D. swelling. Cranium, occipital and L. parietal tenderness. No paralysis. *Operation:* 6 wks. after L. parietal, bone showed inflammatory changes, and softening of outer table at point of maximum tenderness; dura milky white and at one spot cortex almost through. *2nd stage* 7 days after 1st. Some increased pressure; cortex incised posterior part of craniectomy; finger inserted, nothing found. *After 1st stage:* Headache much relieved; no aphasia; V. improving. *2nd stage:* Mentally dull, difficulty in finding the right word; 7 d. after no aphasia. V.a.: R. $\frac{6}{12}$, L. $\frac{6}{6}$. No headache; 4 d. later an attack of mental excitement and terror, with tremor of R. arm; 7 wks. after wound healed, but some bulging and headache; optic neuritis much less, some diffuse choroidal changes; 6 mos. after much improved. V.a.: R.L. $\frac{6}{6}$. *Reply:* 8 yrs. after able to perform household duties and get about; no paralysis; has been attending an ophthalmic hospital, and lately the vision has improved; bulging of wound has decreased and there is but slight pain at intervals; general health quite good.

(12) R. lower central. F. E., woman, aged 33 (Sir W. Gowers, Sir V. Horsley). *Hist.:* 5 mos. a fit, sudden loss of sight, sensation of spinning round R. to L., face drawn to L., and twitched, then loss of consciousness: another attack without the aura the same day; also slight attacks consisting of twitching of the L. face for 5 to 15 minutes on alternate days. There have been three other attacks of the vertigo only without loss of consciousness since the first two; 3 mos. weakness of L. mouth, so that fluids dribbled from it in drinking; 2 mos. L. hand weak and later whole of arm, and L. leg; also want of sphincter control, bladder and rectum; slight frontal headache. *On adm.:* Intelligence and memory fair. V.a.: R.L. $\frac{6}{6}$. No optic neuritis; paresis L. lower face; L. hemiplegia spastic, most distal; L. hemi-anæsthesia to all tests; reflexes deep, all increased L.; abdominal absent L., ankle clonus L.; plantar L. extensor; sphincters, precipitate micturition and defæcation; cranial tenderness R. parietal; 3 wks. after haziness of edges of disks, with filling of central cup, but this subsided later, not completely. *Operation:* R. parietal; dura under compression. *2nd stage* 7 d. after: Brain bulged freely; some tumour felt as if coming to surface above fissure of Sylvius in front of central sulcus; tumour removed, lateral ventricle opened; area of operation included upper lip of fissure of Sylvius, lower motor region and some of posterior and of frontal third convolution. *Microscopical appearances:* Section quadrilateral $\frac{7}{8}$ in. + $\frac{3}{4}$ in., including meninges, cortex, and a small area of sub-cortex. The meninges present appearances typical of gummatous pachymeningitis, dura thickened and fibrous, vessels of pia thickened, and with perivascular cellular infiltration, but all of a chronic nature: the cortex appears natural, but in the sub-cortex the appearances are those of a glioma, with multiplication of glia-nuclei, but otherwise of a quiescent type; most of the vessels here are natural, but some present the perivascular nucleation as in the meninges. *After 1st stage:* Borne well, wound healing well. *2nd stage:* Very little shock; 12 days after wound healed; hemiplegia rather more marked, especially in arm; gait hemiplegic; 1 mo. after no hernia; no trace of optic neuritis; hemiplegia as before; anæsthesia now mostly distal. Discharged on whole improved, but died soon after at home.

(13) R. precentral and posterior frontal third convolution. J. M., man, aged 29 (Sir D. Ferrier, Sir V. Horsley). Syphilis 10 yrs. *Hist.:* 2 yrs. continuous headache; 15 mos. invalided from R.N. for fits: convulsions general, beginning with twitching L. angle of mouth, average 3 a wk.; 3 mos. fits more frequent but slighter, confined to L. face; 3 wks. severe fit followed by L. hemiplegia. *On adm.:* No appreciation of smell. V.a.: R. [illegible], L. [illegible]. No optic neuritis; slight L. hemiplegia and hemi-anæsthesia to all forms; 10 wks. treated

with potass. iodide and ung. hydrarg.; during this time four local and nine severe general fits; becoming dull and depressed, paralysis L. arm increasing, leg less. *Operation*: R. parietal; dura thickened over precentral convolution; pressure raised. *2nd stage:* Dura adherent, and involved in a mass which extended into brain, about lower central, and involving posterior frontal; this was removed. *Microscopical appearances:* Great fibrous thickening of the dura mater and characteristic perivascular leucocytosis of vessels of pia arachnoid extending deeply into the sub-cortex where the glia tissue presents the appearance of glioma seen in Case 12. *After 2nd stage:* Condition satisfactory; little distension of flap, paralysis of L. arm as before, slight only of leg; 6 days after wound healed, considerable bulging; 1 mo. after power returning in hand and arm; 2½ mos. after, discharged, with great improvement in power of arm; gait natural, no fits or headache. *No reply* to inquiries.

(14) L. cerebellum. Man, aged 27 (Dr. Buzzard, Sir V. Horsley). *Hist.:* 2 yrs. posterior headache most left, intermittent, occasional vomiting; L. tinnitus and vertigo; 15 mos. reeling gait, stumbled to L.; paresis L. arm, both tremulous; 3 or 4 mos. sight failing, frequent diplopia; 7 wks. headache more intense and constant, dull and stupid; gait rapidly worse, had taken to bed; some difficulty in swallowing. *On adm.:* Mentally dull, speech slurred, and slow; lies on L. side, occiput to L.; optic neuritis with swelling, R. + 5, L. + 6D.; pupils react, but re-dilate; coarse nystagmus on lateral deviation to L.; paresis L. motor 5th nerve, and L. 7th; hearing rather obtuse; no other paralysis; L. knee-jerk absent. *Operation:* L. cerebellum. Bone necrosed, about 1 in. diameter, in centre of L. cerebellar area; dura under pressure, white and thick. *2nd stage* 9 days after; some positive pressure; tissue of lobe dark coloured; incised and finger inserted to 1 in.; several masses of about the size of peas were scooped out; irrigation removed much softened cerebellar tissue; skew deviation, left down and in, right up and out, followed. *Microscopical appearances:* The section shows much manipulative disturbance of cerebellar tissue; the meninges present the character of gummatous meningitis, and the perivascular inflammation can be traced into the cortex. *After 1st stage:* 2 days conjugate deviation to right, defective; pupils unequal; motor 5th more paralysed. *2nd stage:* Next day skew deviation persists; coarse nystagmus of either eye on attempt to deviate from present position; 14 days after mentally brighter, memory good for past, but he has no recollection of events since admission; optic neuritis subsiding. V.a.: R. $\frac{6}{18}$, L. $\frac{6}{12}$. Skew deviation less; 9 wks. after much improved, some bulging of wound, fluid. V.a. now: R. $\frac{6}{6}$, L. $\frac{6}{12}$; very little swelling; only a trace of skew deviation; nystagmus to R.; L. external rectus paretic; other movements well performed, but with nystagmus; tremor of intention type, L. arm, and pronation supination poorly performed. Left hospital 3½ mos. after, walking stiffly, but otherwise well. Died at home of nephritis, 2½ yrs. after. *P.m.* (Dr. Stewart): L. cerebellar lobe practically absent; no clinical evidence of cerebellar disease since operation. (Case recorded by Drs. Stewart and Holmes, *Brain*, xxvii, 1904, p. 567.)

(15) L. occipital. R. F., man, aged 41 (Dr. Collier, Mr. Armour). Syphilis 17 yrs. ago *Hist.:* 3½ yrs. 3 fits during the month, preceded by sensation of "a cloud over the eyes." 3 yrs., 2 more attacks preceded by alternating blue and red flashes in the R. field of vision for 15 min.; 1 yr. vision impaired in R. visual field. *On adm.:* Occasional severe occipital headache; R. and L. anosmia. V.a.: R. $\frac{6}{10}$, L. $\frac{6}{15}$; low degree of optic neuritis, left more than right; R. hemianopsia; no other physical signs. *Operation:* L. occipital; bone soft; dura under pressure adherent to cortex and thickened; many small nodules like currants, as much removed as possible. *After:* Some shock; 13 days after optic disks normal; hemianopsia more marked; no headaches. *Readmitted:* 11 mos. after, with history of vomiting for a fortnight; diplopia, and unsteady gait 4 mos. before. These symptoms subsided in St. George's Hospital. 14 days severe occipital headache again; for 4 d. diplopia, giddiness, and has given up work. *On readmission:* Mental condition good; anosmia still. V.a.: [illegible] R. and L. O.d.: pale, no swelling; R. hemianopsia as before; nystagmus in all movements, less to right. Gait: Reels to left, cannot stand on L. leg; reflexes all natural. *2nd operation:* 4 d. after admission. *1st stage.* Former craniectomy enlarged posteriorly to expose cerebellum. *2nd stage:* Dura remaining from 1st operation immensely thickened and nodular, especially over L. cerebellar lobe; all removed. *After:* Operation borne well, and good recovery; nystagmus now only slight to left; slightly unsteady on L. leg; no headache;

tinnitus both ears. *Treatment:* Potass. iodide 25 gr.; injection of hydrarg. succinamid. daily. Left hospital practically well, except for above symptoms. Is now perfectly well, 5½ yrs. after operation.

(16) R. frontal. C. M., man, aged 38 (Dr. Holmes). Chancre at the age of 19; wife has had 6 miscarriages, 2 children alive. *Hist.:* 2 yrs. lump R. knee, R. temp. bone and 2 on vertex, these were "taken out"; 6 mos. occipito-temporal headache; vomiting for 14 d.; headache ceased 6 wks. ago; vision dim; some loss of memory; 3 mos. attacks, 6 in all, unconscious. *On adm.:* Memory very defective; cerebration slow; attention fair; melancholic phases. V.a.: R. $\frac{6}{12}$, L. $\frac{6}{20}$. O.d.: early optic neuritis, with + 5D. swelling. Motor, slight L. hemiplegia. *Treatment:* Potass. iodid. 15 gr., ung. hydrarg. 10 d. after. O.d.: As before. Much nystagmus; 17 d. general convulsion; 1 mo. vision as before; in hospital 42 d.; improved. *Reply:* 2 yrs. 4 mos. after, able to work as bookbinder; no paralysis; gait normal; eyesight very good, left eye slightly affected, but improving.

(17) L. frontal (?). G. W., man, aged 51 (Dr. Turner). No history of syphilis, denies risk. *Hist.:* 2 yrs. pain back of neck, and later severe general headache; 12 mos. sight failing; 6 mos. giddiness, loss of consciousness 2 or 3 a day, has fallen sometimes; occasional weakness and numbness L. hand; memory failing and childish lately. *On adm.:* Intelligence, memory and attention poor; cerebration slow; smell defective; taste, does not recognize flavours; hearing, watch on contact, R. and L., bone deafness. V.a.: R. $\frac{3}{60}$, L. $\frac{3}{36}$. O.d.: R. intense opt. neuritis with hæmorrhage + 3·5D.; L. same but less hæmorrhage; Motor: fine tremor and intention tremor both sides. Reflexes deep, equal, brisk; abdom. L. brisker than R.; plantars flexor. *Treatment:* Potass. iodid. and ung. hydrarg. *After:* 15 days much improvement, mental condition brighter, vision improved, headache rarely; 25 days, marked constriction of fields, most left; 29 days visual acuity, R. $\frac{6}{24}$. L. $\frac{6}{36}$; considerable general improvement; in hospital 31 days; self discharged. *No reply* to inquiries.

(18) L. frontal. W. O., man, aged 35 (Sir D. Ferrier). No history of syphilis recorded; married 5 yrs.; no children or miscarriages; history of potus. *Hist.:* 11 mos. headaches, getting more severe; 9 mos. on waking, aphasic for ¼ hr.; 8 mos. in hospital in Hong Kong with severe headache; 7 mos. found to have optic neuritis, became aphasic, with R. hemiplegia; improved on potass. iodid., aphasia disappeared and only slightly dragged R. foot; returned to work; 5 mos. general convulsion, rigid R. side which was weak after; 4 mos. a second fit followed by return of headache and vomiting; 3 mos. returned to England much worse, unable to write, speech very defective, memory failing; 2 fits on the voyage. *On adm.:* Intelligence good; memory poor; speech slurred and some verbal amnesia; smell defective, most R. V.a.: R. and L. $\frac{6}{6}$. O.d.: edges blurred + 1D. Motor: Slight R. hemiparesis; reflexes deep, right brisker than left. *Treatment:* Potass. iod. 10 gr., ung. hydrarg. *Course:* 13 d. great improvement, can read and understand; speech more distinct; memory improved. *Readmitted* 2 mos. after, but no note of condition; treatment continued, and was stated to have been discharged quite well in 4 mos. *No reply* to inquiries.

(19) R. frontal (?). G. B., man, aged 41 (Dr. Buzzard). Syphilis 3 yrs. ago, treated for 2 yrs. *Hist.:* 2 yrs. violent headache, then L. hemiplegia, which recovered in 7 mos.; 9 mos. constant frontal headache, memory failing; 1 mo. vision failing; much depressed; 2 mos. incontinence urine and fæces for 1 mo. *On adm.:* Memory fair; taste delayed R. and L. V.a.: R. fingers at 1½ in., L. at 1 ft. V.f.: R. extremely contracted nasal and lower half, also considerably of temporal and upper; L. less so, but lower field blind. O.d.: optic neuritis, swelling R. + 2, L. + 1·5D.; no paralysis; gait natural; sphincters normal. *Course:* In hospital 66 days; improved very much under potass. iodid. and ung hydrarg., to which he was very susceptible. *Readmitted* 4 months after; had been getting gradually worse; loss of smell; vision failing; mental confusion; incontinence again. *On adm.:* Dull, lethargic. O.d.: Consecutive atrophy, was in hospital 51 days, and left no better. Letter of inquiry endorsed "deceased," no date.

(20) R. post-central. A. M., woman, aged 32; married 11 yrs.; 7 pregnancies: Nos. 1, 2, 3 died wasting; No. 4 miscarriage; No. 5 alive; No. 6 lived 6 mos; No. 7 lived 2 mos.; 18 mos. after marriage she had syphilis, treated 18 mos. *Hist.:* 2 yrs. swelling over R. knee; 5 mos. fit, general convulsion; left arm weak after; 5 since, and slight attacks also. *On adm.:* Much headache; V.a.: R. $\frac{6}{24}$, L. $\frac{6}{18}$. O.d.: early neuritis; slight L. hemiplegia,

anæsthesia and analgesia. In hospital 40 days, treated with potass. iodid. and ung. hydrarg. Paresis disappeared and left hospital quite well 4 mos. after. *Reply:* Able to work at home and get about; no paralysis, gait natural; vision improved by glasses.

(21) R. post-central. J. R., man, aged 27 (Sir W. Gowers). Syphilis 6 yrs. ago. *Hist.:* 6 wks. R. frontal headache, occasional nausea and vomiting; 18 days aura of formication L. hand, clonic movements L. arm, with loss of consciousness; 3 attacks since. *On adm.:* No mental symptoms; optic neuritis with swelling + 2D.; no other physical signs. *Treatment:* Potass. iodid. 20 gr., hydrarg. succinamid. ½ gr., daily injections; later ung. hydrarg.: left hospital quite well. O.d.: Normal. *Reply:* 3 yrs. after, able to work as optician; headache occasionally; vision weak.

(22) R. central. H. C., man, aged 48 (Dr. Tooth). History of gonorrhœa only. *Hist.:* 10 mos.; morning headache lasting 1 to 12 hours; L. temporal and occipital; 5 mos. gradual left hemiparesis; 4 mos. sight failing; 5 wks. tinnitus. *On adm.:* V.a., R. $\frac{6}{6}$, L. $\frac{6}{5}$. O.d.: no optic neuritis; L. hemiplegia, with wasting of left limbs; reflexes deep, left increased; abdominals absent; plantar L. extensor; gait hemiplegic. *Treatment:* Potass. iodid. 15 gr., ung. hydrarg. *Course:* Great improvement in power left side and gait after 2 mos. treatment. *Reply,* 4½ yrs. after: At work as naval chart printer; no symptoms except occasional pain on top of head; general health excellent; gait natural.

(23) R. post-central. H. D., man, aged 53 (Dr. Beevor). Syphilis 32 yrs. *Hist.:* 9 wks. giddiness a few seconds at a time, followed by loss of power both legs, most L.; 4 wks. failing vision. *On adm.:* Excitable; intelligence and memory only moderate. V.a.: R L. $\frac{6}{36}$. O.d. optic neuritis double, some hæmorrhages, swelling + 3 R. and L.; L. hemiplegia spastic. *Course:* After 1 mo. of treatment by potass. iodid. 20 gr. and ung. hydrarg. great improvement, less rigidity of left leg; optic neuritis subsiding; 2 mos. walking fairly naturally, but still some rigidity of leg. *No reply.*

(24) L. post-central inferior. A. R., man, aged 39 (Dr. Buzzard). Gonorrhœa 16 yrs. *Hist.:* 5 yrs. severe frontal headache at intervals; occasional vomiting; 2 yrs. attack, R. face drawn up, stuttered, lost consciousness, lasted 10-15 min., then diplopia; one month later weakness R. hand and arm to elbow; transient blindness R. eye; 2 mos. permanent blindness R. eye; paraphasia, and failing memory. *On adm.:* Cerebration slow, emotional; cranial tenderness, L. temporal. V.a.: R. blind, L. $\frac{6}{60}$. O.d.: double optic neuritis, swelling R. + 5·5., L. + 3·5D., all in stage of subsidence; slight weakness R. arm; R. hemi-anæsthesia; gait natural. *Course:* Improved considerably after 2½ mos. treatment; headache almost gone, no fits; anæsthesia less, and sight rather better. *Reply* from widow: Died 8½ mos. after admission, became totally blind and paralysed some time before death.

(25) R. pre-central. L. T., man, aged 36 (Dr. Ormerod). *Hist.:* 3 yrs. became unconscious sitting at table, remained so ½ hr., then fell, generally rigid, no clonic convulsions, recovered consciousness some hours after; similar attacks since, every 3 wks.; vomited after; frequent severe right temporal headache, with giddiness; 3 wks. vision failing and fits with tongue-biting, and involuntary micturition more frequent; 14 days L. hemiplegia. *On adm.:* Fits now begin in L. arm and occur at very short intervals; in intervals answers questions slowly but correctly; no optic neuritis; L. hemiplegia, flaccid of arm, spastic of leg; R. frontal headache; 3 days after admission temp. rose to 105·5° F., then normal for 2 days, finally 101° F. to 102° F.; died on 6th day after admission. *P. m.:* R. fronto-parietal bones much thickened; dura thick and quite opaque and strongly adherent to brain; no tumour found.

(26) L. temporo-sphenoidal (?). L. M., woman, aged 36 (Dr. Batten). History of many miscarriages. *Hist.:* 9 wks. confused; 6 wks. headache and vomiting; 7 days diplopia; subjective sensations of smell and taste; 4 days speech defective. *On adm.:* Irritable and querulous, some "Witzelsucht." V.a.: R. $\frac{6}{12}$, L. $\frac{6}{18}$. O.d.: neuritis. R. + 3, L. + 4D. swelling. O.m.: L. ext. rectus paretic; slight convergent strabismus; R. face weak; tremor R. hand. *Treatment:* Potass. iodid. 10 gr., ung. hydrarg. *Course:* Improved as to headache, but other signs remained unaltered for 10 mos., then headache again, 2 or 3 convulsions and died at home 1 yr. after admission.

(27) Multiple gummata, temporo-sphenoidal, mesencephalon, with pachymeningitis of R. hemisphere. W. B., man, aged 38 (Dr. Russell). No history of syphilis. *Hist.:* 7 days

headache, giddiness and unsteady gait, proptosis, both eyes, 2 days double ptosis. *On adm.:* Semicomatose; pulse 40, irregular. Resp.: 20, stertorous. O.d.: early neuritis double. Pupils: Left larger than right, both inactive to light. Divergent squint, no movement in vertical plane; considerable proptosis; unable to protrude tongue; L. spastic hemiplegia, but R. limbs also weak. Died 2 hrs. after admission. *P.m.:* General pachymengitis; 4 separate gummatous foci found. (1) Mesial aspect anterior part of R. temporo-sphenoidal extending backwards to descending horn of lateral ventricle, and compressing R. crus. (2) A small gumma ventral to red nuclei, involving both 3rd nerves. (3) R. upper post-central. (4) R. occipital lobe, external aspect.

(28) Cerebellum. J. K., man, aged 40 (Dr. Turner). No history of syphilis, denies risk. *Hist.:* 9 mos. sight failing; 4 mos. paralysis of lateral movement of eyes, no impairment of vertical movements; 7 mos. progressive unsteadiness and weakness of legs. *On adm.:* No mental symptoms. V.a.: R. $\frac{6}{18}$, L. $\frac{6}{6}$. O.d.: R. highly coloured, edge irregular, old choroidal changes, lower retina detached; L. normal; traumatic cataract, R. lens; double ptosis; lateral deviation either side absent; convergence and vertical movement preserved. No weakness of limbs; gait stamping and reeling. *Treatment:* Potass. iodid. 20 gr., ung. hydrarg. The movements of the eyes improved very much in 6 wks., but the gait remained much the same. *Reply,* 5 yrs. after: Unable to work, can only creep about; eyes fixed; considers that he is worse than before admission.

(29) L. cerebellum. S. B., woman, aged 21 (Dr. Turner). *Hist.:* 2 yrs. fell, cut head, occasional headache and vomiting since; 8 mos. vomiting in morning and after food; severe headache, right posterior; 3 wks. after this sight suddenly became dim and in three days blind, when she became unconscious for three days, the attack being preceded by vertigo and actual rotation from left to right; since this ticking tinnitus and progressive deafness of left ear; also numbness of left leg to knee; in Sussex County Hospital at that time there was agustia, and R. anosmia. All these symptoms improved while there. *On adm.:* Intelligence and memory good; nerve deafness left ear not absolute; R. anosmia; taste defective left side. V.a.: R. $\frac{6}{24}$, L. cannot count fingers. Double consecutive optic atrophy; pupils R. larger than L., react slightly and re-dilate; slight right ptosis; jerky nystagmus either side; L. hemiparesis; gait unsteady, tends to left. *Treatment:* Potass. iodid. 25 gr. and ung. hydrarg.; 1 mo. after great improvement; hearing as before; smell natural. V.a.: R. $\frac{6}{12}$, L. $\frac{6}{24}$. Pupils equal, react well; gait much improved; 2 mos. still improving. V.a.: R. $\frac{6}{9}$, L. $\frac{6}{18}$. *Reply,* 5 yrs. after: Has since married, has had two miscarriages, the first at 7 mos., followed by severe eclampsia; is able to do housework; no paralysis; can see to read, but there is some degree of optic atrophy, not progressive; headaches occasionally, and sometimes a difficulty in swallowing; very neurotic, but general health good.

(30) Cerebellum and pons. J. G., woman, aged 34 (Sir W. Gowers). 3 yrs. husband had syphilis. *Hist.:* 2 yrs. posterior headache, most R., radiating to back of neck, persistent; 12 mos. gait reeling and stumbling, deviating to L.; legs weak, also L. mouth; frequent vomiting; diplopia followed by failing sight, first. in L. eye; 4 mos. rumbling tinnitus L. ear, with increasing deafness. *On adm.:* Intelligent, but some loss of memory; anosmia R. and L.; taste absent on anterior two-thirds of tongue; some deafness L. ear, air conduction better than bone; quite blind; consecutive atrophy with some swelling of both disks; paresis of conjugate movements of eyes to left; complete anæsthesia all forms, L. 5th upper division, slight of lower, and lower face L. paretic; swallowing difficult, occasional regurgitation through nose; attitude of head cerebellar; arms both weak and ataxic; legs weak, L. most so; gait staggering, deviates and falls to L.; reflexes R., arm absent, L. slight, knee-jerks absent. *Treatment* for 29 days: Potass. iodid. and ung. hydrarg.; no improvement, became unmanageable and using obscene language. *No reply* to inquiries.

(31) L. crus cerebri. W. P., man, aged 39 (Dr. Taylor). Six yrs. syphilis, treated for 13 mos. *Hist.:* 3 mos. R. hemiplegia slight, sudden onset; dysarthria and later vomiting; 7 wks. diplopia; 14 days headache; 7 d. L. ptosis. *On adm.:* Dazed, depressed, memory poor, speech slow. V.a.: $\frac{6}{10}$, myopic. Early optic neuritis; pupils unequal; L. ptosis, ocular movements impaired; paresis R. lower face; R. hemiplegia; some atopognosis R.; 1 mo. after, Wassermann doubtful; improved very much except as regards sight. *Readmission* 6 mos. after; 3 mos. recurrence of headache; vision failing; R. $\frac{6}{10}$, L. $\frac{6}{15}$; optic

disks, edges blurred partly, swelling R. + 2, L. + 1·5D.; diplopia on looking up and to left; no hemiplegia now; 5 days after, Wassermann positive; 8 days after a dose of salvarsan; almost free of headache since. *Reply*, 4 mos. after salvarsan injection: Can work, no paralysis; vision much improved, almost normal; no headache.

(32) Gumma cerebri. E. W., woman, aged 34 (Dr. Ormerod). One child living, 2 premature, 1 miscarriage. *Hist.*: 11 mos. occipital headache and delirium, was in hospital 8 mos. and improved, but headache and vomiting recurred; attacks of "shaking of limbs" both sides, preceded by colour spectra; 3 mos. V. misty. *On adm.*: Intelligence fair. V.a.: R.L. $\frac{6}{36}$. O.d.: neuritis with steep swelling, R. + 4·5, L. + 4D. Smell very defective; Wassermann positive. *Course*: Treatment potass. iodid. and ung. hydrarg. V.a.: Improved to R.L. $\frac{6}{12}$. Five days after adm. had a fit, convulsed both arms, no loss of consciousness; 1 mo. after, two maniacal attacks, improved. *Reply*, 16 mos. after: Practically well.

(33) Basic pachymeningitis (?). L. S., girl, aged 19 (Dr. Ormerod). *Hist.*: 4 yrs. ulceration of throat; 3 wks. vertigo followed by loss of consciousness and continual vomiting; 11 days diplopia. *On adm.*: Drowsy, memory poor; O.d. neuritis; vertigo L. to R.; L. 6th n. paralysed; R. slight; R. 7th paresis; all deep reflexes and abdominals absent. *Treatment*: Potass. iodid. and ung. hydrarg.; optic neuritis and headache subsided, but paralysis of L. 6th n. unaltered. *Readmitted* 17 mos. after. Had been perfectly well, without any squint for 5 mos.; then squint recurred with headaches and vomiting, all of which disappeared on treatment as out-patient; 7 mos. before readmission, tinnitus both ears, and fainting attacks every morning, also headaches again. *On adm.*: Bright and intelligent. V.a.: R. $\frac{6}{12}$, L. $\frac{6}{6}$. O.d. pale and opaque, L. + 3D. swelling. Slight weakness L. ext. rectus; 5 wks. after, discharged perfectly well. *No reply*.

(34) Gumma cerebri (?). J. H., man, aged 34 (Sir W. Gowers). Oct. 18, bubo L.; Oct. 20, gonorrhœa; 11 mos. soft sore. *Hist.*: 6 mos. influenza followed by melancholia; in Claybury Asylum for 5 mos.; 4 mos. V. failing; 3 mos. deafness R. ear. *On adm.*: Mental condition good; smell L. and taste absent. V.a.: Fingers at 5 ft. O.d.: late stage of neuritis subsiding to atrophy. Improved in all respects on treatment by potass. iodid. 10 gr. and ung. hydrarg. *No reply*.

(35) Gumma cerebri (?). E. A., man, aged 19 (Sir W. Gowers). *Hist.*: 6 wks. frontal headache and vomiting, since which lethargic; 14 d. diplopia. *On adm.*: Intelligent. V.a.: $\frac{6}{6}$. O.d.: intense neuritis R. + 6, L. + 4D. swelling. O.m.: Both external recti weak. Nystagmus coarse, most to R. *Treatment*: Potass. iodid. 10 gr. and liq. hydr. perchlor. ½ dr. *Course*: Great improvement in all respects. *Reply*, 6 yrs. after: Perfectly well.

(36) Gumma cerebri (?). F. L., man, aged 45 (Sir W. Gowers). Syphilis Oct. 20. *Hist.*: 2 mos. severe headache frontal and occipital; V. failing; irritable and obstinate; 3 wks. two or three faints, followed a few days later by staggering gait, loss of speech; 7 days R. hemiplegia, and complete incontinence. *On adm.*: Disoriented in time and space; memory poor, drowsy; dirty in habits; dysarthria; hearing watch at 2 in. R. and L. V.a.: R. $\frac{6}{36}$, L. $\frac{6}{18}$. O.d.: neuritis, most R. + 4D. swelling. R. ptosis; R. ext. rectus weak; fine nystagmus to L.; R. hemiparesis; gait, deviates to L., R. shoulder advanced. *Treatment*: Potass. iodid. and ung. hydrarg.; improved in 7 wks., except as regards condition of disks; ptosis less. *No reply*.

(37) Gumma cerebri (?). E. W., woman, aged 48 (Sir W. Gowers). *Hist.*: 18 mos. severe posterior and temporal headache, constant; V. failing L. eye; 12 mos. blind L.; 6 mos. drowsy, sleeping all day for 9 wks; 3 wks. a fit, face twitched, then R. arm, fell, rigid, passed water, unconscious for 3½ hrs.; for 3 days repeated convulsions. *On adm.*: Intelligence and memory very poor. V.a.: Blind L. eye, R. ? normal. O.d.: old neuritis. O.m.: convergence weak. No paralysis, but R. arm slightly rigid. *Treatment*: Potass. iodid. and ung. hydrarg.; slight improvement. *No reply*.

(38) L. temporal (?). E. M., woman, aged 48 (Dr. Ormerod), 14 children, 4 d. in convulsions, 1 miscarriage. *Hist.*: 14 mos. struck by husband in L. eye and head driven against bedstead; headaches ever since; 13 mos. fit, unconscious 2½ hrs., preceded by vertigo; 5 fits since; 4 mos. transient loss of speech; 6 wks. difficulty in reading. *On adm.*: Rather stupid; amnesia verbalis; anosmia; hearing defective R. and L. V.a.: R. $\frac{6}{18}$,

L. $\frac{6}{12}$. O.d.: neuritis with hæmorrhages; R. + 2, L. + 1·5D. swelling. *Treatment:* Potass. iodid. and ung. hydrarg. *Course:* Very emotional and religious; headache and speech improved; discharged at own request. *No reply.*

(39) Gumma cerebri (?). Frontal (?). W. A., man, aged 33 (Sir W. Gowers). Syphilis at the age of 19. *Hist.:* 6 mos. attacks of morning vomiting for 3 days, every 3 wks.; headache severe, left temporal; occasionally falls owing to legs gradually giving way at the knees. *On adm.:* Apathetic. V.a.: $\frac{6}{6}$. O.d.: neuritis + 4D. swelling. O.m.: slight weakness both external recti; fine tremor both arms, most L. *Treatment:* Potass. iodid. and ung. hydrarg. *Course:* Improved, optic neuritis completely subsided. *No reply.*

(40) Gumma cerebri (?). C. W., woman, aged 38 (Dr. Tooth). No children; 1 miscarriage. *Hist.:* 2 yrs. sores on genitals; headache, vertical and posterior; occasional vomiting; 1 yr. hair falling off. *On adm.:* Intelligent. V.a.: R. $\frac{6}{6}$, L. $\frac{6}{12}$. O.d.: edges blurred. R. + 1, L. + 2·5D. swelling. *Treatment:* Potass. iodid. and ung. hydrarg.; improved, optic neuritis subsided; headache less. *No reply.*

DISCUSSION.

Mr. DONALD ARMOUR informed the meeting that the patient referred to in the President's paper as No. 15, on whom he (Mr. Armour) operated, was now well and at work.

Sir DAVID FERRIER, F.R.S., said the President had made a very valuable contribution to the important question of the operative treatment of syphilitic gummata which did not yield to other treatment. He could not say that he had himself had experience of cases of this kind, because most of his cases had done very well under the ordinary antisyphilitic treatment. But he had also had several cases in which for years, in spite of the most active antisyphilitic treatment, including mercurial inunction, there had been repeated relapses, these taking the form, chiefly, of Jacksonian fits. And he had often thought that in such cases where there was evidently an irritative cicatrix in the cortex, it would be proper to endeavour to remove it surgically. The results which the President had just detailed seemed entirely to justify such a course. What would weigh with him particularly in such cases would be whether the lesion was single or multiple, or whether the irritative cicatrix or thickened membrane or gumma could be removed without inflicting damage on the brain, and so possibly making the patient's condition worse than before. He would have regard particularly to the point whether removal would implicate such an area that the patient might be left with sensory or motor aphasia or severe hemiplegia. He was glad to see from Dr. Tooth's sections that, in the great majority of instances at all events, the cicatrix could be removed without injury to the cortex, because the cortex itself was so often free from lesion. But he would not counsel this until he had first tried prolonged and active treatment by means of the ordinary remedies, and now that salvarsan was available this would enable measures to be even more thorough than before.

Cerebral Symptoms in a Bulldog associated with Lymphocytic Infiltration of the Vessels and Membrane of the Brain and Spinal Cord.

By Frederick E. Batten, M.D.

The bulldog, aged 16 months, was under the care of the veterinary surgeon, Mr. James Broad, who has kindly furnished the following history: The dog, which was a valuable prize animal, was first noticed to be unwell on January 19, 1913, about a week after he had covered a bitch. The first symptoms were those of muco-gastro-enteritis accompanied by some slight weakness in gait. The intestinal symptoms improved and the dog seemed better in general health. The nervous symptoms, however, gradually became more pronounced. The eyesight became affected, the gait more uncertain, with a curious high-stepping action of the forelimbs. During the last week of his illness—viz., from February 7 to 14—he became very drowsy, slept a great deal, and would stand with his head in a corner, scraping at the wall. All these symptoms were more pronounced when just roused from sleep.

I saw the dog with Mr. Broad on February 15. The dog was dull and listless, paid no attention to his surroundings, and when placed on the floor would walk round the stable with his head hanging down, knocked against any objects that came in the way, and frequently fell: if he fell he could rise, but made no great effort to do so. If put on his legs he continued to walk aimlessly round the stable, sometimes going round in one direction, sometimes in the other. There was marked ataxia of the limbs, but it would not be said to be more marked on one side than the other. There was a rhythmic tremor of the muscles of the forelimbs. He appeared to be blind and took no notice of light thrown into the eye. The fundus of the eye did not show any change.

There was no definite rigidity of the limbs and no actual paralysis. All the reflexes were present. An attempt was made to obtain the cerebrospinal fluid by lumbar puncture, but this was not successful. As the dog was getting worse and there seemed but little hope of recovery, it was killed with chloroform and an autopsy made.

To the naked eye the brain and spinal cord appeared normal. There

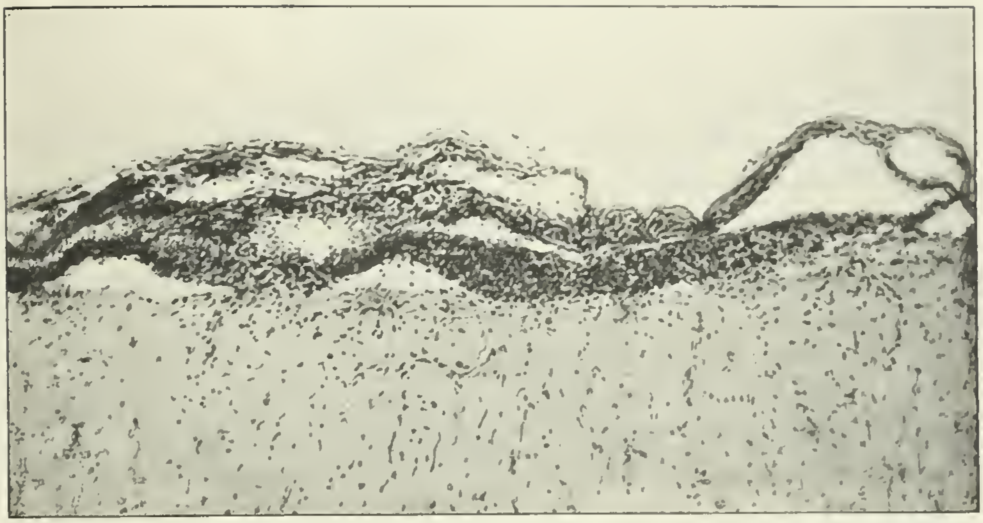


Fig. 1.

Section through membrane of the brain, showing lymphocytic infiltration of the pia mater.

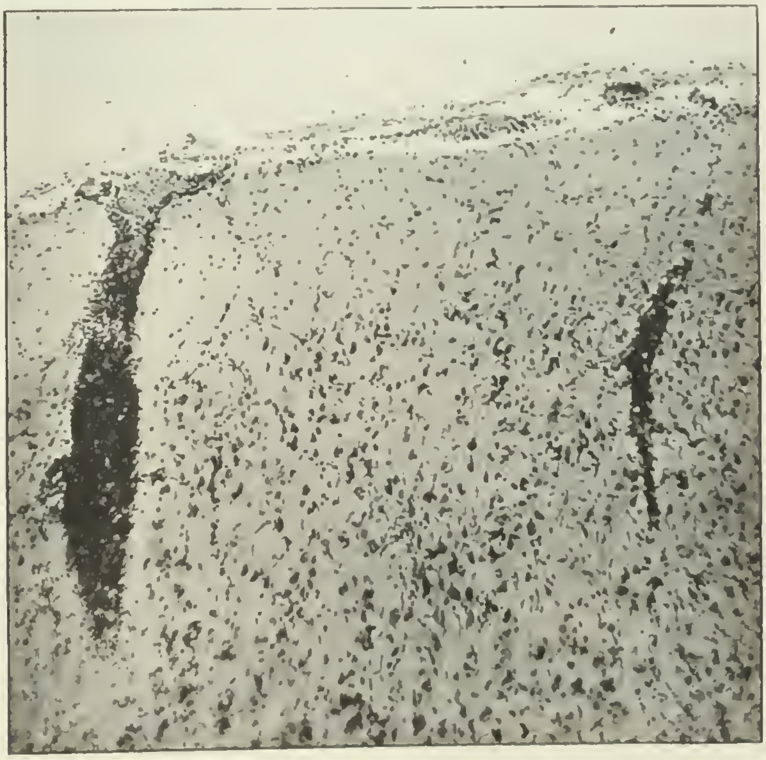


Fig. 2.

Section through the cortex of the brain, showing perivascular exudation extending in from the surface.

was no meningitis or opacity of the membranes. The brain and spinal cord were placed in formalin solution and preserved for further examination. The intestine showed marked follicular ulceration, both in the large and small intestine. Mr. Broad stated that this was common in dogs. The root of the penis had a curious warty appearance which was said not to be normal.

Microscopical examination of the brain and spinal cord was made by the usual methods. Although the brain appeared normal to the naked eye, yet on microscopical examination a very marked infiltration of the pia arachnoid with lymphocytic cells was present (fig. 1). The vessels, extending into the substance of the brain from the cortex, showed the most marked perivascular exudation (fig. 2), and the vessels in the substance of the hemisphere showed the same change. Although the change was most marked around the vessels it was not limited to them, but the infiltration affected the cerebral substance.

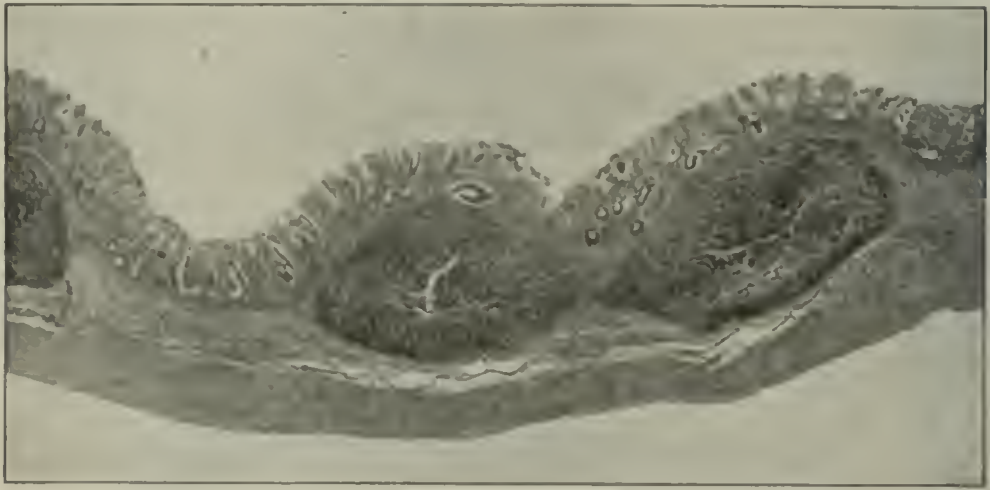


Fig. 3.

Section of ulcer of the intestine, showing destruction of the mucous membrane over the surface of a lymph follicle.

In the spinal cord the same perivascular lymphocytosis was found in the cervical region, affecting chiefly the vessels in the grey matter, but not limited to them. Sections of the thoracic and lumbar portions of the spinal cord appeared normal.

By the Marchi method a few degenerate fibres could be seen in the section of the cortex and also in those of the spinal cord, but the change was slight compared to the marked perivascular change. The changes in the cells both of the brain and spinal cord were slight, except in the immediate neighbourhood of a vascular lesion.

Section of the ulcers of the intestine showed destruction of the mucous membrane and infiltration of the submucous coat with lymphocytic cells in the region of the lymphoid follicles (fig. 3).

Sections of the "warts" at the root of the penis showed a lymphocytic infiltration of the subepithelial tissue, with destruction of the true epidermis and lymphocytic infiltration on the surface (fig. 4).

The bitch which this dog had covered did not, unfortunately, become pregnant, otherwise it would have been interesting to observe the condition of the puppies, or, if she had miscarried, of the fœtuses. It would also be of interest to see, if this bitch were again covered by another dog, whether he would become similarly infected.

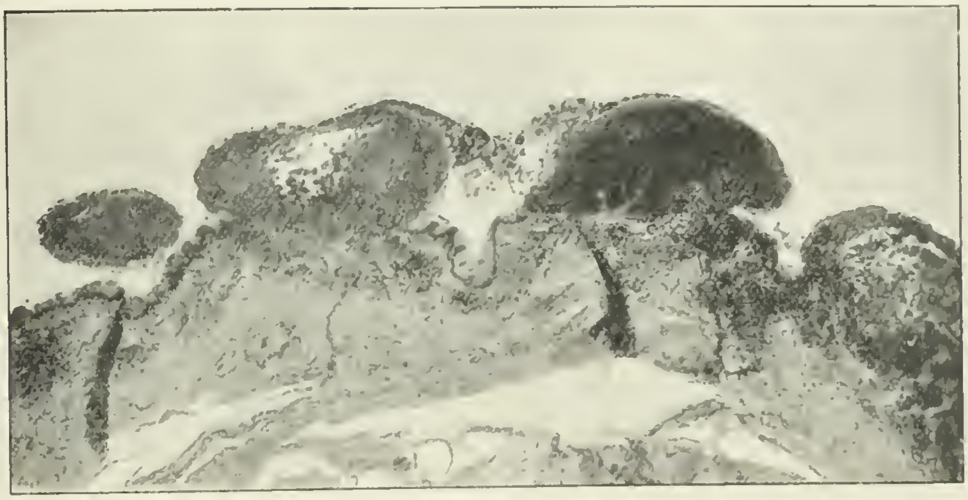


Fig. 4.

Section of the "warts" of the penis, showing lymphocytic infiltration on the surface and rupture of the true skin.

L. Marchand and Petit [4] describe a diffuse subacute meningo-encephalitis in dogs. The progressive enfeeblement of intelligence, of physical weakness and blindness, are symptoms closely resembling those described in the above case. The perivascular lymphocytosis is also a striking feature.

Bellingham Smith and Washbourn [5] have described infective venereal tumours in dogs, and the appearance of the growth on the penis of the dog figured by them is not unlike the warty condition seen in the bulldog. Apart from this, however, there did not seem much similarity. Although the tumours persisted for many months in Smith's and Washbourn's dogs, no mention is made of cerebral symptoms. The microscopical appearance of the tumours does not correspond to the condition found in the bulldog.

The interpretation of the above observations must remain doubtful. The character of the perivascular lymphocytosis is similar to that seen in man in syphilitic, trypanosomic and poliomyelitic infection, and is similar to that seen in dogs suffering from nervous symptoms following distemper, in mal-de-coit or dourine in horses. Somewhat similar cases in dogs have been described by Holmes and myself in a paper in these *Proceedings* [1], and in the *Veterinary Journal* [2].

Experimentally, it should not be difficult to reproduce this disease in dogs, either by the injection of an emulsion of the brain or possibly by glycerine extract of the same. Flexner and Clark [3] have, however, failed to do this in a somewhat similar case recently reported.

REFERENCES.

[1] BATTEN and HOLMES. *Proc. Roy. Soc. Med.*, 1908, i (Neurol. Sect.), p. 22.

[2] *Idem.* *Vet. Journ.*, 1908, n.s., xv, 179-187.

[3] FLEXNER and CLARK. "Paralysis in a Dog simulating Poliomyelitis," *Journ. Exper. Med.*, 1913, xvii, p. 577.

[4] MARCHAND, L., and PETIT. "General Paralysis in Dogs," *Arch. Internat. d. Neurol.*, 1912, p. 317. (Abstracted in *Rev. Neur. and Psych.*, Edinb., 1913, xi, p. 33.)

[5] SMITH and WASHBOURN. *Trans. Path. Soc. Lond.*, 1897, xlviii, pp. 310-323.

The Clinical History and Morbid Anatomy of a Case of Generalized Sclerodermia with Severe Muscular Atrophy.

By James Collier, M.D., and S. A. Kinnier Wilson, M.D.

Generalized sclerodermia with affection of the muscles is a rare disease and there have not been many pathological investigations of this interesting condition. The case here reported is peculiar in that it differs from the group described as "dermatomyositis" in the absence of an acute onset, the absence of acute pain, muscular tenderness, swelling of the muscles, and the absence of subsequent hardening and contracture in the affected muscles. It is further peculiar in that the distribution of the muscular affection was much more extensive than was the skin affection. In most of the reported cases of sclerodermia with myosclerosis the muscular affection has been co-extensive with the skin affection and this has given rise to the opinion that the myosclerosis resulted by an extension of the sclerotic process from the skin to the underlying muscles. Brocq, however, has shown that the muscle affection is apart from the skin affection and that the former may be much more extensive than the latter. He considers that an "infiltration" of the muscle comparable with the œdema of the skin occurs at first and that this is followed by sclerosis, and his views are followed by Dinkler, Rosbach and Unna. We have been able to find one case only in the literature of the subject which is comparable to the case that we here report and this was recorded by J. A. Nixon,[1] but in Nixon's case the skin was adherent to the underlying tissues, and contractures were present though the muscles were intensely wasted. This case was not investigated pathologically.

Clinical Account.

S. Y., aged 54, was admitted into the National Hospital in August, 1912.

Complaint: Hardening of the skin of the face and of the back of both hands and wrists. Gradual loss of strength all over. Inability to raise head.

Duration: Of induration of skin twenty months. Gradual loss of strength, fourteen months. Inability to raise head, five months. Worked as a book-folder till five months before death.

---

[1] *Bristol Med. Surg. Journ.*, 1903, xxi, p. 328.

Family history negative.

Personal history: Born in England; healthy. Married at the age of 25. One child born dead at term. Three alive and well. Worked until her marriage and for the last fifteen years as a book-folder.

History of illness: In December, 1910, in the course of a few days she noticed that the face, eyelids, and backs of the hands became swollen and that she had some dull pain in these regions, which were not red, nor had she any fever. The swelling after lasting some weeks gradually disappeared and a feeling of stiffness came on in these regions, and the colour of the skin gradually became darker, but over the knuckles and the finger-joints small white patches of skin were noticeable. From this time on she noticed dull pain in the upper limbs and legs which disappeared ten months before death. Ten months before death a dull pain appeared between the shoulders and in the neck which persisted till the end, and soon after difficulty in moving the head and neck became marked. Gradually the head seemed to be pushed forwards and her gait became stooping. For five months her head fell forwards and she was unable to raise it, and had difficulty in moving it from side to side and in rotating it. About this time skin of neck became harder and darker in colour. From the onset her general muscular strength had been slowly failing, weakness in the back and trunk being especially marked as time went on. Her hands and arms became smaller. She had great difficulty in raising the legs off the bed and in assuming the sitting position when lying down. For several months before death she had trouble in walking, and it was necessary for her to throw the abdomen forwards and the shoulders back to keep from falling. Eventually she became unable to walk without assistance.

Condition on admission: A pale, feeble-looking, poorly nourished woman. Intelligence good. Marked cervico-dorsal kyphosis with the head bent forwards. This position could not be voluntarily corrected. Skin of face indurated, contracted, glossy, dry, typical "masque sclérodermique." Skin of neck, hands and lower forearms moderately indurated and darkly pigmented. Slight pigmentation of chest. The skin of the upper arms, lower limbs, and rest of trunk was normal. Cranial nerves and special senses normal. Speech slightly thick. Swallowing a little difficult. Face moved fairly well considering the skin condition. Marked wasting of deep muscles at back and sides of the neck, so that the sides of the vertebræ could be felt plainly. Marked wasting of both upper trapezii and both sternomastoids. No hardness or string-like standing out of these muscles. All movements of head on neck much impaired. Extension of head and neck impossible and the head fell forwards when unsupported. Shoulder-girdle muscles: Some wasting of these, especially of the pectorales and deltoids. Muscles flaccid, not hard or contracted. Power limited. Hand muscles and muscles of lower forearm, small and somewhat hard. No contracture. All movements limited and somewhat feeble. Trunk muscles: All movements weak, especially of recti abdominis and erectores spinæ. Obvious wasting of these muscles. Could not sit up without help. Muscles of the lower extremities seemed normal except that flexion of the thigh upon the trunk was very weak. Sensation normal. Reflexes: Absence of abdominal and epigastric reflexes: otherwise normal. Electrical reactions: Faradic excitability lost in right sternomastoid, right pectorals, and very sluggish in the other neck and shoulder-girdle muscles. Galvanic excitability feeble. No R.D.

The patient was in hospital for two months. During this time the temperature was slightly above the normal, being always above 99° F. at night, but never reaching 100° F. She was treated with massage and passive movements and exercises, thyroid extract, iodides, salicylates and intestinal antiseptics. She improved very much in her walking and became able to get about alone. In the middle of one night, being sleepless, she was given a cup of cocoa, which she drank with satisfaction. Nurse took the cup from her hand, and had walked half way down the ward towards the kitchen when the patient uttered a loud scream, and nurse, on rushing to the bedside, found her white and pulseless, and when the house physician arrived two minutes later she was dead.

Clinically and so far as the lesion of the skin was concerned this was a typical case of generalized sclerodermia. The initial œdema and subsequent sclerosis and pigmentation were such as usually occur in this disease and were in the usual distribution. The slightly raised temperature and the sudden causeless death which the pathological findings do not explain are well known in connexion with this malady. The severe muscular weakness and atrophy extending far beyond the regions in which the skin was affected, and the fact that in the face, where the sclerodermia was marked, the facial muscles were unaffected, were very unusual and are worthy of emphasis. The absence of hardening and of contracture in the affected muscles, which was so conspicuous in this case, has not before been reported and was such as to suggest the combination of progressive muscular atrophy with sclerodermia, were it not that the pathological changes in the muscles exclude the former disease.

Pathological Examination by S. A. K. Wilson, M.D.

When removed at the necropsy, the brain, spinal cord and membranes appeared normal on naked-eye examination.

The liver and the kidneys did not present any obvious abnormality. Both suprarenal bodies were removed; they were of rather large size, but otherwise did not appear diseased. The left suprarenal weighed 7·01 grm. The pituitary body was normal in appearance, and was also removed for subsequent examination.

The thyroid gland was placed unusually low: it was small and very firm, and on its being cut across a microcystic condition of the left lobe, more particularly, was found. Traces of the thymus gland, embedded in fat in the anterior aspect of the pericardium, were removed.

Pieces of the following muscles were taken: Right and left sternomastoids, left flexor brevis minimi digiti, left abductor minimi digiti, left flexor carpi ulnaris, muscles of the right thenar eminence. Pieces of the skin and subcutaneous tissues were removed frem the anterior and posterior aspects of the lower left forearm, and from the posterior surface of the left carpus, as well as from over the left thenar eminence. Portions of the ulnar and median nerves on that side were also removed.

Microscopical Examination.

Right and left suprarenals: Sections were stained in hæmatoxylin-eosin and hæmatoxylin-Van Gieson. Speaking generally the microscopical structure of these glands was normal. In one or two places in the medulla, however, were collections of small round cells, aggregated together in their centre and spreading irregularly through the interstices of the medullary tissue at their periphery. What appeared to be a slight hyperplasia of the medullary cells was noted in the left suprarenal. In the cortex of the left suprarenal was a small benign adenoma.

Pituitary body: Sections were stained in hæmatoxylin-eosin. The gland was of normal appearance microscopically; a good deal of colloid secretion was present in the pars intermedia. In the pars anterior nearly all the cells were of the finely granular variety; very few deeply staining basophile granular cells were seen. A large amount of pigment was seen in many of the neuroglial cells of the pars nervosa.

Thymus: No trace of persistent thymus tissue could be found in the fat removed from the anterior aspect of the pericardium.

Thyroid: Sections were stained in hæmatoxylin-eosin and hæmatoxylin-Van Gieson. The normal vesicular appearance of the gland was to a great extent replaced by a double pathological process, consisting on the one hand of interstitial overgrowth, and on the other of parenchymatous changes. While increase in the fibrous tissue of the gland was apparent, it was not very extensive. The parenchyma presented a curious appearance. In some places were large vesicles, forming small colloid cysts several millimetres in diameter. A more frequent change was a breaking up of the normal vesicles into very small subdivisions, separated from each other by strands of the cuboidal epithelium, which was in a condition of active hyperplasia. In many places there was more epithelial overgrowth than colloid visible in the microscopic field. A striking irregularity in dimensions and shape of the vesicles resulted.

Skin: Sections from the areas above referred to were stained with the same tissue stains as for the thyroid. Where the greatest sclerodermatous change had taken place, it was seen that the atrophy of the skin mainly concerned the corium. The stratum corneum, stratum lucidum, and stratum granulosum appeared to be normal throughout: the cells of the stratum Malpighii were, generally speaking, normal, but this layer as a whole was somewhat reduced to about two-thirds or less of its normal width, and its under-surface was in many places almost mathematically straight. The normal papillæ of the corium had almost entirely disappeared. The blood-vessels and nerves of the papillæ were very difficult to trace. Where the skin of the patient was pigmented, as on the posterior aspect of the carpus, minute pigment granules were to be seen in the deepest layer of cells of the rete mucosum. No sweat gland ducts or orifices were found where the skin was most sclerodermatous; the ducts were observed to run obliquely at such spots, making their way out to the surface where the papillæ of the corium were still to be seen. There was a dense felting of fibrous tissue in the affected corium.

Muscles: The same stains were employed as those enumerated above. The changes to be described were considerably more marked in some muscles than in others, and it is important to emphasize the fact that the most severe involvement was not noted in the muscles underlying the parts of the skin that were most affected by the sclerodermatous process, but in those at some distance. In other words, there was no indication of a panatrophic process passing inwards from the skin; further, the central regions of the muscles involved were as much affected as their peripheral parts.

In the muscles which had shown the greatest amount of atrophy the microscopic changes were the furthest advanced. For an instance the sternomastoid may be taken. A profound interstitial myositis was the most conspicuous feature of the pathological picture. Scattered throughout the muscle were foci of varying size, consisting of innumerable small round cells, sometimes forming masses distinctly visible to the naked eye, at other times running between muscle fasciculi and forcibly separating the parenchymatous tissue. As a consequence many muscle fibrils where the round cell infiltration was at a maximum were fragmented and distorted to a marked degree. It was difficult to ascertain whether the overflow of small round cells bore any relation to the blood-vessels of the tissue; in some places, apparently, it was directly round a vessel; in others, however, no vessels could be detected in the immediate neighbourhood. In one or two spots a number of minute vessels were seen where the small cell exudate was very large and the endothelium of these vessels was swollen and œdematous. This was well seen in a particularly large focus found in the left abductor minimi digiti. In yet another spot (right sternomastoid) the cells in immense numbers followed the course of an intramuscular nerve for some little distance. They were all apparently small lymphocytes, with a minimum of cytoplasm surrounding a circular nucleus.

A further interstitial change was constituted by a notable fibrous overgrowth, which was very advanced in several of the muscles examined. Van Gieson sections showed this particularly well. The invasion of fibrous tissue was seen in all the muscles examined, varying in degree: in the sternomastoid there was much more fibrous tissue than muscle parenchyma. The interstitial changes just enumerated were spread equally through the particular muscle examined and were not obviously concentrated at any one spot.

As far as the actual muscle substance was concerned, the alterations it exhibited were profound. Many muscle fibres were split longitudinally into smaller bundles of fibrils. Others, probably the majority, were characterized by a striking varicosity, the fibre being often rather swollen, but preserving both cross and longitudinal striation. In some places this varicosity was extreme, and the remarkable fact could be readily ascertained by examination of the sections that a varicose fibre might have as its neighbours on either side a fibre maintaining its normal straight, or only slightly wavy, appearance. Where the parenchymatous changes were early, the chief feature of the fibres was a rounding off of their normal polygonal contours, whereby they became circular, or nearly so, and were separated from each other by overgrowth of the perimysium. Where the changes were more advanced, the fibres became very unequal in transverse dimensions, some being twice as large as others, or more. In one or two places (left abductor minimi digiti) quite large homogeneous-looking rounded fibres, isolated from their neighbours, were seen. Often the fibres were noted to stain unequally. In the case of the swollen varicose fibres it appeared to be the sarcoplasm that was increased. The nuclei of the sarcolemmal sheaths were in some places present in considerable number, but, speaking generally, they were not greatly increased, except where muscle fibres had split longitudinally; in these many sarcolemmal nuclei could be seen. The muscle spindles did not reveal much pathological alteration, with the exception of some thickening of their walls. This, however, was not constant.

In a few places fatty degeneration of the muscle had set in.

The inequality in the severity of the degenerative changes in the muscles has already been commented on. The right sternomastoid was more grossly diseased than the left. The muscles of the left thenar eminence were in considerably better condition than the muscles of the little finger: of these, the abductor showed marked changes, while the flexor brevis was not so affected. The flexor carpi ulnaris was as degenerated as the right sternomastoid.

Peripheral nerves: These were stained by Marchi's method, but they showed no trace of degeneration, nor were they deformed in any way, or the seat of any obvious interstitial change.

Spinal cord: Sections were stained with hæmatoxylin-eosin, Nissl, and Weigert-Pal methods. No indication of pathological change was obtained on an examination of the membranes and white columns of the cord. There was no small cell infiltration round any of the vessels. In the cells of the grey matter, however, especially of the anterior horns, evidence of a pathological process was very apparent. The changes were more marked in the cervical than in the lumbar region. They consisted in an atrophic degeneration of the motor cells, the great majority of which were rather shrunken, sometimes elongated; they stained rather deeply and were a little difficult to differentiate: pigmentary degeneration was often present. In not a few cells perinuclear chromatolysis was found: in others there was thickening of the nuclear membrane. In the cervical region the number of motor cells was reduced: many persisted merely as shells of chromatin material surrounding a mass of pigment. There was no indication of more acute parenchymatous cell change—i.e., no sign of swollen cytoplasm with excentricity of the nucleus and general granulation of the tigroid substance. Similar atrophic changes, on a smaller scale, were found throughout the whole cord. In the lumbar enlargement the number of anterior horn cells was not materially reduced. The intermediolateral tract was examined in seven out of the twelve thoracic segments of the cord, and in many cases the cells were seen to be in a condition of subacute degeneration, with excentricity of the nuclei, swelling of the cell body, and with a varying degree of perinuclear chromatolysis.

No further changes that need be enumerated were found in the central nervous system.

DISCUSSION.

Dr. F. E. BATTEN said that this case of dermato-myositis certainly differed from some of the other recorded cases, and it differed essentially from the case which he himself recorded not long ago before the Section.[1] Dr. Collier insisted on the fact that it was the muscles in their deeper portions which were affected, that it was a universal affection of muscles, not one which spread from the skin into the superficial portion of the muscle. In the case he recorded the skin was hard, firm, and infiltrated; the muscles were firm, and contractions had occurred. He showed a photograph of a child which was under his care fifteen months—i.e., from the onset of her illness to her death; the limbs showed contractions. The arms could be extended only to just beyond the right angle. The muscles were firm and hard, and there was much hardening of the skin. She was subject to attacks in which the skin and subcutaneous tissue became red and inflamed, and the muscles under the skin hard and infiltrated. He expressed the belief that the condition was an infective one, and that Dr. Collier's and Dr. Wilson's case was similarly infective, but with different clinical manifestations.

Sir DAVID FERRIER said he did not quite follow Dr. Collier's theory of the pathogeny of the condition—whether he attributed it to thyroid abnormality. The suprarenals, he believed, were said to be normal. Could Dr. Collier draw any relationship between the condition of the thyroid in these cases and its condition in cases of myxœdema?

---

[1] *Proceedings*, 1912, v, pp. 103-14.

Dr. COLLIER, in reply, said that he wished to emphasize the fact that in this case the skin was nowhere adherent to the underlying tissues. An extension of a sclerotic process from the skin to the muscles, therefore, could not be argued in this case as it had been in cases of dermato-myositis where the skin was invariably adherent to the muscles, and in which the sclerotic process seemed to invade the muscles from the periphery. There seemed to be two conditions of sclerosis of the muscles which had been described in connexion with sclerodermia and dermato-myositis: one in which the muscles were more affected at their surfaces and in which the sclerotic process seemed to invade the muscles from surface to centre, and the other in which the muscles were affected equally throughout their bulk. The latter condition had led certain pathologists to hold that the sequence of events in the muscle was in the first place an acute parenchymatous change comparable to the œdema which occurs in the skin at the beginning of the sclerodermia, and secondly fibrosis. The occurrence of widely spread fibrosis of the internal organs in some cases suggested that a very widely spread pathological process was at work. In answer to Sir David Ferrier's question, Dr. Wilson and he suggested that the changes which they had found in the cells of the intermedio-lateral tract, since these are the origin of the sympathetic nerves, might be the cause of some alteration in the nature and balance of internal secretions from which the pathological process under consideration might result. In answer to Dr. Batten, he agreed that the clinical aspect of cases of acute dermatomyositis did suggest an infective process as responsible for the condition, but this hypothesis remained to be proved.

Neurological Section.

May 22, 1913.

Dr. H. H. Tooth, C.M.G., President of the Section, in the Chair.

Lipodystrophia Progressiva.

By F. Parkes Weber, M.D.

I would define "lipodystrophia progressiva" (λίπος = fat, δυς = bad, τροφή = nourishment), a term to which we are indebted to Dr. A. Simons[1] (of Berlin), as a morbid condition, possibly confined to the female sex, and characterized by progressive disappearance of the subcutaneous fat from the face, upper extremities and trunk, whereas the fat of the lower extremities and gluteal regions remains unaffected or is increased in amount. In some cases, perhaps, the condition is one of pathologically altered distribution of fat rather than of genuine wasting, or possibly merely of relative excess of fat in the lower extremities and buttocks of an otherwise rather thin subject. Although I have retained the adjective "progressiva" as suggested by Simons, it is by no means certain that the disorder is always a progressive one. In all probability all degrees of this abnormal fat distribution occur, progressive in some subjects and arrested or stationary in others, whilst in yet other cases the condition may probably occur as only a temporary feature in the life-history of a patient or as little more than a slight exaggeration of a normal female sex-character. In this connexion it must, of course, be remembered that the development of subcutaneous fat is greater in the thighs and gluteal regions of the average human female than of the average male. This local distribution of subcutaneous fat constitutes practically a secondary sex-character, and the gluteal prominence is greatly exaggerated in some African races, constituting the racial peculiarity known as "steatopygia," which is illustrated by the pictures of the "Hottentot Venus."[1] In regard to the occasional exaggeration of this sex-character in Europeans, I would quote a remark made by Pierre Marie at the discussion of a case at the Société de Neurologie, at Paris, July 11, 1912—namely, that it is not rare to meet with women the upper part of whose bodies is emaciated in comparison to the fatness of their lower limbs. A curious fact is that in some pathological conditions, notably in the case of a young woman shown by Dr. H. G. Turney at the Royal Society of Medicine, on March 5, 1913, as probably an example of "a pituitary and adrenal syndrome," this sexual predominance of subcutaneous fat about the thighs and gluteal regions is altogether wanting, though there may be an apparently excessive accumulation of subcutaneous fat in the face and trunk.

---

[1] *See* R. Cassirer, "Die vasomotorisch-trophischen Neurosen," Berl., 1912, 2nd ed., p. 675. Simons published his case in the *Zeitschr. f. d. ges Neur. u. Psych.*, Berl., 1911, v, p. 29. It is the same case as Holländer's (*see* p. 129).

In June, 1911, I saw a young unmarried woman, aged 27, of Jewish parentage, who had lost almost all the subcutaneous fat from her body, but less from the parts below the iliac crests and groins—that is to say, from the buttocks, thighs and legs—than from the trunk, face and upper extremities; moreover, there was no extreme loss of fat from the orbits or mammæ. I found no evidence of any visceral disease. There was a report of temporary glycosuria about one year previously,[2] which I regarded as of no importance. The clinical history was that the patient was a healthy girl up to the age of 16, when the menstrual periods commenced. Since then her general condition had been unsatisfactory. She suffered from a certain amount of pain with the periods and likewise complained of dyspepsia and of insomnia, for which she had taken various drugs. She was likewise discontented with life in her parents' home, and was desirous of obtaining some useful occupation, which would render her more independent. In

---

[1] In regard to the racial distribution of "steatopygia," see S. G. Shattock, "On Normal Tumour-like Formations of Fat in Man and the Lower Animals," *Proc. Roy. Soc. Med.*, 1909, ii (Path. Sect.), pp. 209-226.

[2] Transient glycosuria is, I believe, not rarely to be found in young persons with various disorders of general nutrition and development. I have noted it myself in an underdeveloped girl of the "mitral infantilism" class and in a young woman with a moderate degree of infantilism of the "ateleiosis" class. I showed both these cases at the Royal Society of Medicine in the first half of 1913.

January, 1913, I heard that her condition remained much the same. There was some neuropathic family history, and the condition had to be regarded as a peculiar variety of emaciation, probably in some way dependent on the nervous system, the distribution of the fat atrophy being specially affected by the patient's sex, so that the lower extremities (normally very liberally supplied with subcutaneous fat in females) retained their fat.

At the time when I saw this patient in 1911 I had already seen one similar case, namely that of a young woman, aged 21, brought before the Clinical Society of London by Dr. Harry Campbell, on March 22, 1907.[1] He then described the case as one of "Disappearance, more or less complete, of the subcutaneous fat above the region of the lower extremities." The wasting of the fat was specially marked in the face, chest, and abdomen, including the region of the mons veneris, but there was no disappearance of fat from the mammary glands or the orbits, and there was an abundant deposit of subcutaneous fat in the buttocks and lower extremities generally. The patient, who was of Jewish parentage, was said to have been perfectly normal up to the age of 6, but from that time to the age of 14 there occurred a gradual disappearance of fat from the affected regions. The fat first disappeared from the face and then the process of fat absorption gradually spread downwards at the rate of about 1 in. every year. Six years later Dr. Campbell showed the case again, and said that the absorption of subcutaneous fat had spread about 6 in. downwards during the six years' interval. The orbital fat and the mammary fat still remained unaffected. Tests revealed no difference between the secretion of the sudoriferous glands in the affected and unaffected areas. He regarded the case as one of "trophic" changes of obscure origin.[2]

In the very similar case of a young woman, aged 21, described and illustrated by Dr. Eugen Holländer, of Berlin,[3] the intra-orbital fat appeared likewise to some extent to have shared in the atrophic process, so that the patient had a peculiarly cadaverous expression. The cheeks were sunken and the orbits were hollowed out around the eyes. The mammæ were round and hard, but apparently consisted of glandular tissue only. The superficial muscles of the neck, trunk and upper extremities were mapped out, as in "anatomical manikins."

---

[1] H. Campbell, *Trans. Clin. Soc. Lond.*, 1907, xl, p. 272.

[2] H. Campbell, *Proc. Roy. Soc. Med.*, 1913, vi (Neurol. Sect.), p. 71.

[3] E. Holländer, *Münch. med. Wochenschr.*, 1910, lvii, p. 1794.

Below the hips, on the contrary, all the parts were covered by subcutaneous fat in abundance, and, indeed, there was decidedly abnormal excess of fatty tissue in the outer parts of the thighs. Except for a rotatory nystagmus, apparently of congenital origin, nothing else abnormal could be discovered. All kinds of treatment had been tried but had failed to fatten the patient, that is to say, to fatten the emaciated parts; but from the cosmetic point of view Holländer seems to have been more successful by injecting a sterilized mixture of human fat and mutton suet into the subcutaneous tissue of the face.

Sir William Osler has very kindly told me of a similar loss of subcutaneous fat, but occurring in a much younger girl. She was aged only 10, in 1895, when she was first brought for treatment as a dispensary patient in America. The contrast between the extreme thinness of the face, trunk and upper extremities, and the plumpness of the part below the hips was very great. She had begun to get thin five years previously, the loss of flesh being first noticed on the face and back. She was very pale. Her mother and mother's mother were said to be "nervous." Information obtained in February, 1913, showed that menstruation had commenced when the girl was aged 12, and that her general condition improved afterwards. Her face had still little subcutaneous fat, though more than it had before; but no complete examination of the patient had been made during late years. Though she still looked thin and weak, she said she felt well and was stronger than most women. The tendon reflexes were excessive.

A case, evidently of the same class, was described by A. Pic and Ch. Gardère, at the Society of the Medical Sciences of Lyons, on December 23, 1908, as an example of "generalized atrophy of the face and parts of the body above the umbilicus with pseudo-hypertrophy of the pelvic region and lower extremities."[1] The patient was a woman (age not stated) whose illness had commenced four years previously, with sudden loss of weight and strength, anorexia, digestive troubles, and pallor. There was no cough. She was unable to continue her work, as the slightest effort gave rise to palpitation of the heart and feeling of oppression. She was also mentally depressed, and gave way to frequent attacks of crying without any reason. After a "rest and feeding cure" she commenced to regain her strength, her lower extremities increased in size, and her pallor disappeared. At last, after an interruption of one and a half years, she was able to start work again. Nevertheless, her face, upper extremities and thorax remained emaciated, whilst her lower extremities progressively increased, chiefly in amount of subcutaneous tissue, so that their size came to be in striking contrast to the skeleton-like appearance of her face and the upper part of her body, in which, however, the mammæ retained their normal size. The tendon reflexes in both lower and upper extremities were markedly exaggerated; in the lower extremities more than one jerk was sometimes obtained by a single tap ("clonic or trepidation type" of response); the plantar reflexes were of the normal flexor type, no disorder of sensation was present. Electrical examination of the muscles showed nothing abnormal. Her gait was natural, and there was no longer any special tendency to fatigue on exercise. Some physical signs in the chest pointed to the presence of slight pulmonary tuberculosis. Menstruation (which had commenced at the age of 15) was regular, and had always been so, excepting at the commencement of her illness four years previously, when she had amenorrhœa for six months.

---

[1] Pic and Gardère, *Lyon Méd.*, 1909, cxiii, p. 61.

The case of "Segmentary Adiposis of the Lower Limbs," recently published by Laignel-Lavastine and Viard,[1] must probably be regarded as belonging to the group we are now considering, though the emaciation of the face and upper part of the body was less decided. Their patient was an unmarried woman, aged 39, embroiderer by occupation, who complained of great enlargement of the lower extremities. This commenced, according to the patient's account, at the age of 22, and first involved the legs, then the thighs, and lastly the buttocks. Various methods of treatment had been resorted to (thyroid extract and iodine, milk diet, &c.), but without satisfactory results. The great size of her lower extremities offered a striking contrast to her thin chest and the general slenderness of the upper part of her body. The left thigh was decidedly larger than the right thigh, but both thighs, both buttocks and both legs shared in the enlargement. The mammæ were very small. The thyroid gland was slightly enlarged. The menstrual periods, which had commenced at the age of 14, lasted only two days each time. At the Salpêtrière the patient had been given associated thyroid and ovarian extracts, but as yet without any effect on the size of the lower extremities.

Laignel-Lavastine and Viard, besides the case of Pic and Gardère already described, quote a case published by L. Barraquer, at Barcelona, in 1906. It is that of a young woman, aged 25, who in her thirteenth year, after an attack of "influenza," had commenced to waste rapidly in her face and the upper part of the chest. These wasted parts contrasted strikingly with the plump condition of the rest of her body.

---

[1] *Nouvelle Iconogr. de la Salpêtrière*, Par., 1912, xxv, p. 473 (with plate).

It seems, therefore, that "lipodystrophia progressiva" varies in degree in different cases. In some cases it is the excessive growth of subcutaneous fatty tissue in the lower extremities that attracts attention rather than any very decided emaciation in the face and upper parts of the body. In such cases the condition may be regarded as an exaggeration or *caricature* of the ordinary tendency to fat distribution, which constitutes almost a "secondary female sex-character." In other cases the wasting of the face and upper part of the trunk first attracts attention, the wasting usually commencing in the face, neck and upper part of the thorax and spreading gradually downwards. In some of these latter cases the onset of the wasting may be fairly sudden and the disease may, for a time at least, be associated with anorexia, neurasthenic symptoms, and excess of knee-jerks and Achilles-jerks. Such excess of tendon reflexes is often met with in persons of nervous temperament, and, I think, more frequently in persons of Jewish than in those of Anglo-Saxon or Teutonic descent. It may here likewise be noted that the two first patients, whose cases I have above referred to, were of Jewish descent, and it is possible that some of the other patients were also of that race.

The symptoms may commence in quite early life, at 10 or 13 years, or later on, up to between 20 and 30 years of age. The disease, though it seems (at all events in its most typical forms) to be confined to the female sex, does not appear to be connected with any obvious disease of the thyroid gland or ovaries. In a sense it might certainly be called a "trophic disease," but it is of uncertain origin, and no successful treatment has yet been discovered for it.

In regard to diagnosis, the distinctions from the cases of "trophœdema," as described by H. Meige and others, seem to me too obvious for discussion, and the same may be said in regard to the conditions of muscular hypertrophy or pseudo-hypertrophy met with occasionally in various cases of primary muscular dystrophy, as well as in the typical pseudo-hypertrophic group. Other diseases, such as the various forms of chronic œdema and elephantiasis in the lower extremities connected with lymphatic obstruction, are still less likely to be confused. Just at the commencement, when the atrophy of subcutaneous fat is still almost limited to the face, the condition might possibly resemble that seen in cases of "bilateral atrophy of the face"; indeed, it is just conceivable that certain cases of bilateral atrophy of the face may have been mild examples of lipodystrophia progressiva, modified by the male sex of the patients, males not being so inclined as females to special deposit of subcutaneous fat in the lower extremities. At the Clinical Society of London, in 1905,[1] H. Batty Shaw showed a boy, aged 10, who had commenced to show bilateral wasting of the subcutaneous tissues of the face when he was aged 2½. The boy was brought to the hospital because the mother feared he might have tuberculosis. A. F. Hertz and W. Johnson,[2] at the Clinical Section of the Royal Society of Medicine, in January, 1913, showed a young man, aged 26, whose face had become progressively thinner during the last two years, so that his friends thought he must be consumptive. There was no weakness of the facial muscles, and otherwise he was well developed and strong. I instance these two cases of facial wasting in males to illustrate the kind of cases of "bilateral atrophy of the subcutaneous tissue of the face" to which I wish to draw attention in connexion with the diagnosis and pathological classification of "lipodystrophia progressiva."

I have given no photograph or drawing of the condition of lipodystrophia progressiva, but no such illustration is needed. For a typical case one need only imagine a grotesque figure, the lower part of which seems to be modelled after an extraordinarily florid Venus of the "ultra-Rubens" style, whilst the face and upper part of the trunk might call up a picture of one of the forbidding Moeræ, or their dreaded sisters, the Erinyes, or might bring to mind the popular idea of one of the witches in "Macbeth."

DISCUSSION.

Dr. HARRY CAMPBELL said Dr. Parkes Weber had brought forward records of some very interesting cases, but it did not seem to him (the speaker) that all the cases described belonged to the same category. Dr. Weber began by referring to cases mentioned by Marie, of Paris, cases of women who were emaciated above the hips; but he (Dr. Campbell) considered this condition quite a common occurrence; it was not rare for a woman to give the impression of being very thin whereas she was, as a matter of fact, quite plump from the waist downwards. But these cases did not come under the same heading as the case he (Dr. Campbell) showed. He had not read the description of Holländer's case. In his own case there was a disappearance of subcutaneous fat, commencing in the face, and gradually spreading downwards, and there was a sharp line of demarcation between the normal and the abnormal parts. He did not know whether Holländer's case answered to that description. Dr. Parkes Weber alluded to a class of case in which there was an actual increase in the deposition of fat. These cases he (Dr. Campbell) regarded as belonging to a separate category altogether. In his own case there was no increase of fat deposit. The whole question of the distribution of fat he regarded as a very interesting one. There were some people who could never get fat in the face, no matter how plump they were elsewhere; others retained the round contour of face even when the body was emaciated. Some easily developed a double chin, while others could not be made fat in the region of the neck. These differences must be due to local peculiarity of the subcutaneous tissue. The absorption of fat in the cases referred to by Dr. Weber could not be due to alteration in the blood—e.g., the presence or absence of some particular ferment—otherwise there would be a generalized absorption, or a generalized laying on, of fat.

---

[1] H. Batty Shaw, *Trans. Clin. Soc. Lond.*, 1905, xxxviii, p. 222.

[2] Hertz and Johnson, *Proc. Roy. Soc. Med.*, 1913, vi (Clin. Sect.), p. 92.

Dr. PARKES WEBER, in reply, said he thought that the changes in the amount and distribution of the subcutaneous fat to which he had alluded must be due to some general cause, not merely a local cause, for marked symmetry in the dystrophy was a striking feature of the cases. The less typical cases doubtless merged into a condition which was relatively quite common—namely, a condition characterized by thinness of the upper part of the body and relative excess of fat in the lower extremities, as referred to by Pierre Marie, in the discussion which Dr. Weber had quoted.

Case of Rapid Wasting of Muscles of Hands and Arms. (?) Cause.

By H. CAMPBELL THOMSON, M.D.

A BOY, aged 18, came under observation at Middlesex Hospital in January 1913, complaining of difficulty in using his thumbs, which he had noticed gradually coming on for about a month previously. The small muscles of both hands were weak and wasted, and on the left side there was also some weakness of extension of wrist and fingers.

Since that time the weakness and wasting have steadily progressed. No sensory symptoms have been observed except that occasionally he says he gets some tingling in the arms at night.

The electrical reactions of the affected muscles taken on January 14 by Mr. Lyster showed a slow and weak reaction to the faradic current, and Mr. Lyster reports that the muscles do not give the reaction of degeneration. The tendon reflexes of the arms were easily obtained, and the knee-jerks were rather brisk. The plantar reflexes were both flexor.

The boy had been working for some time at an occupation in which he handled various metals such as brass and gun metal, and occasionally lead. The possibility of any metallic poisoning was considered, especially in view of the fact that at times he has had abdominal pains associated with constipation, and that in 1911 he was one night admitted to the hospital with acute abdominal pain and some rigidity of the abdomen, which all rapidly cleared up. There is no blue line on the gums, and analysis of urine shows no signs of the presence of lead. Another interesting point in the history is the fact that when aged 13 he suffered from an attack of optic neuritis, the cause of which is not known to him.

Mr. William Lang has examined the eyes, and reports that the results of a former neuritis are quite evident in both eyes, and that the vision is diminished and the fields are somewhat contracted.

It seems possible that in this case there is some underlying condition which formerly set up the optic neuritis, and is now causing the wasting of the muscles, which latter is apparently due to an affection of the cells of the anterior horns of the cord.

DISCUSSION.

Dr. CAMPBELL THOMSON added that from the remarks he had heard on the case, it seemed to be thought that the condition might possibly be due to specific infection, though the one Wassermann test that had been carried out was negative.

Dr. WILFRED HARRIS asked whether the exhibitor had considered the possibility of syringomyelia; the atrophic condition of the hands, with the progressive kypho-scoliosis, made one think of that condition, although he understood there were no dissociation changes in sensation. Still, cases of syringomyelia had been observed before dissociation changes set in, and the fact that the boy had had optic neuritis might be considered as possibly connected with gliomatosis of central origin. A condition analogous to optic neuritis was known in connexion with syringomyelia—namely, cerebral compression and convulsions due to obstruction of cerebrospinal fluid. He had had a case of syringomyelia in which the man became comatose and had convulsions on three occasions, though he had no optic neuritis.

Dr. A. W. MACKINTOSH said there was a case under his care which had optic neuritis during life, well marked, and which was proved by autopsy to be a case of syringomyelia. The patient was a woman, aged about 45. The condition extended from the cervical to the lumbar region; there were the typical cavities in the posterior columns and the central region, with a large gliomatous tumour in the cervical cord. He believed there were changes as high up as the medulla, but nothing abnormal could be found in the brain.

Primary Progressive Myopathy; Facio-scapulo-humeral (Landouzy-Déjerine) Type; Advanced Stage.

By FREDERICK S. PALMER, M.D.

D. G., AGED 21, of Polish extraction, was shown at the clinical evening of the Medical Society of London[1] on November 11, 1907, with the following note:—

"Both parents are alive and well. There was no history of any familial nervous or mental disease to be traced in the ancestry or collaterals on careful inquiry. He had five brothers and two sisters, all living and healthy. One brother died in infancy from laryngeal diphtheria, and a sister, aged 2, from some pulmonary disease. He had measles at the age of 5, in a mild form, and no other illness. He was apparently quite well until eighteen months ago, when he complained of fatigue and weakness in his arms. At the same time it was observed that he did not close his eyes tightly, and his face had altered in appearance. Weakness and wasting of the muscles commenced at the same time, and had been steadily progressive. He had a well-marked myopathic facies, the cheeks and lips were flaccid, and both lips had a thickened appearance—whistling and puffing are badly performed. The orbiculares were distinctly weak. Both shoulders

---

[1] *Trans. Med. Soc. Lond.*, 1908, xxxi, p. 355.

drooped, and the scapulæ were winged. There was very marked wasting of the pectorals, sternomastoid, and trapezii, also of the muscles of the shoulder-girdle, and arms; but those of the distal segments were well preserved. His gait inclined to the waddling type with lordosis. The knee-jerks on both sides were absent, and there was some hypertrophy of the glutei. Brissaud's sign of apparent lengthening of the neck was well shown."

Since this note was made five and a half years ago the disease has been slowly but steadily progressive. In spite of his and his mother's indignant denials of the existence of nervous disease in the family, a younger brother, aged 19, presented himself at the hospital about six months ago with unmistakable evidence of the same disorder in an early stage. The patient still works daily as a tailor, but his weakness has increased a great deal in the last twelve months, and he complains of pain and stiffness in both arms after exertion. There is now extreme wasting of the muscles of his face, neck, shoulder-girdle, arms, chest, and back, but those of the forearm are still well preserved. The weakness is most marked on the right side. When he attempts to rise from a chair he uses the left arm and hand chiefly to assist his efforts. The scapulæ wing out freely from his chest; the lower cervical and upper dorsal vertebræ are very prominent, and he has marked scoliosis. In the lower limbs the muscles are all wasted, particularly on the right side, with the exception of the glutei, which are considerably hypertrophied, and present much the same appearance as is seen in cases of pseudo-hypertrophic paralysis. Taking into consideration the lordosis, he walks fairly well, but his gait is more like the steppage variety than waddling. The facies is typical, although he can quite close his eyes and faintly whistle. Both knee-jerks and ankle-jerks are absent; the abdominal are present on the right side only, and the plantars are flexor in type.

Dr. HARRY CAMPBELL said he had noticed in this case, while in the hospital, that there was a de-pigmentation of the skin over the areas affected with muscular atrophy; there was less pigment there than in other parts.

Case of (?) Atrophic Myotonus.

By Wilfred Harris, M.D.

C. L., a girl, aged 16, when aged 7 first began to suffer from slight spasm and turning in of the right foot. A year later a similar condition was noticed in the left foot, the twitching gradually becoming more noticeable. The arms also began to be affected about this time in a similar manner though less severely, and the disease steadily progressed until her admission to the Maida Vale Hospital last year. She had then been unable to stand or walk for more than three years, owing to the strong spasms in the muscles of the lower extremities, and the extreme contractures of the feet, and she was accustomed to get about by crawling on her hands and knees. She could feed herself and dress herself slowly if left alone. Previous health good; no illnesses except measles three years ago. Not a nervous child. Family: One brother a year younger, quite well. No family nervous disease known.

When admitted to Maida Vale Hospital in March, 1912, she was quite unable to stand, and lay in bed usually with her legs drawn up, though she could extend the knees slowly and jerkily at times, but the flexor spasm was more noticeable under observation, the feet were extremely contracted in the equino-varus position, the toes also being strongly flexed. The arms could not be raised above the horizontal position owing to weakness of the serratus and lower trapezius, causing partial winging of the scapula, particularly on the left side. The deltoids and all the other muscles of the upper extremities were well developed and normal, though spasmodic contractions continually affected the adductors, the flexors of the forearms and wrists. She could write with great difficulty. The facial muscles and all cranial nerves normal. Knee-jerks brisk; no extensor plantar; sensation normal. Sphincters normal. Intelligence good. Tenotomy of both Achilles tendons and injection of the internal popliteal nerves with alcohol diminished the flexor spasm of the toes and ankles so that the foot could be brought to a right angle, and since that was done nine months ago she has been able to get about on her feet and walk a little with help.

DISCUSSION.

Dr. HARRIS added that there was an absence of pain and sensory symptoms, and there was no family history of anything resembling it. The fact that the spasm increased somewhat on examination seemed to suggest a functional element, but she had obvious muscular atrophy and weakness of some muscles in the shoulder-girdle, particularly on the left side, where partial winging of the scapula was obvious, partly due to weakness of the trapezius and partly to weakness of the serratus magnus. That was sufficient to take it out of the functional group only. Three years ago she lost her power of standing or walking, and at that date she was bedridden. He had her in the hospital last year, and the tendo-Achillis was tenotomized ; he also injected the internal popliteal nerve with alcohol, so as to overcome the flexor spasm. Since then it had been possible to get her foot flat on the ground, and she could walk after a fashion. He felt inclined again to bring her feet to a right angle, under an anæsthetic, put them in plaster, and let her get about on them like stumps. The spasm was more clonic than tonic, though there were no rapidly alternating contractions as in ordinary myoclonus. All the muscles reacted to faradism. The shoulder-girdle muscles, however, were weak, as also were the leg muscles, but there was no reaction of degeneration. The onset was very gradual.

Dr. FARQUHAR BUZZARD was not inclined to commit himself to a diagnosis, but, looking at the case generally, he was impressed by the absence of symptoms which proved the defect to be a muscular one. There were features about the patient which suggested a central origin for the trouble. Some muscles were hypertrophied as compared with others, especially those continually in spasm, but there was no definite muscular atrophy. He was somewhat surprised that Dr. Wilson had not claimed the case as one of lenticular degeneration, since it had features suggesting double hemiplegia of a non-pyramidal type.

Dr. HEAD drew attention to the great resemblance of this case to one shown by Dr. Purves Stewart last November,[1] especially in regions other than the legs. In Dr. Harris's case the legs were in a more advanced condition, but in the shoulders the likeness to the case of Dr. Purves Stewart was remarkably close. In both cases the winging of the scapula seemed to be more due to spasm than to wasting of the muscles, and there was in both cases the same singular hypertrophy of all the muscles, which were thrown into tonic contraction.

Dr. S. A. K. WILSON said the difference between Dr. Purves Stewart's case and this one consisted mainly in the condition of the lower extremities. As far as Dr. Buzzard's remarks were concerned, he (Dr. Wilson) scarcely thought the case could be one of progressive lenticular degeneration. The state of the lower extremities was interesting because of the appearance of double hemiplegia and contracture. Yet when the patient was placed on her feet her heels came down to the ground, and that was what happened in lenticular cases. But in the present case the only resemblance was in the lower extremities; there was a different condition in the upper extremities. And he thought the case presented differences from Dr. Purves Stewart's case, as in it the lower extremities were definitely affected.

---

[1] See *Proceedings*, p. 58.

Case of Progressive Double Hemiplegia.

By H. H. Tooth, M.D., C.M.G.

A. Y., girl, aged 11. History: The child was delivered by forceps at birth and had a considerable depression on each parieto-temporal region for a long time after, but otherwise was a normal baby. At the age of 8 was noticed to limp and drag right foot. This appeared suddenly, but gradually increased. Soon after a similar condition appeared in the left leg. Two years ago tenotomy was performed in Germany for contraction of the right foot. At this time both arms became weak. Later the head was noticed to droop in sitting up and the spinal muscles became weak. Family history: Both parents, two sisters and one brother, alive and well. No miscarriage.

On admission: A flabby, fairly fresh complexioned child, with a somewhat large but well-formed head, and a bored, apathetic expression. Mentally slow and wanting in brightness and initiative. No facial symptoms; some tremor of tongue. Pupils equal and react naturally; right and left lateral nystagmus; optic disks natural. No cranial nerve weakness. Motor system: The child cannot sit up without assistance, and then the head falls forward or over to right shoulder helplessly. Upper extremities: General weakness in all movements, more pronounced in the extensor, perhaps. Grasp very feeble. No wasting of any muscles apparent, the general nutrition is good, and the limbs and back are plump. At this stage of the examination the general appearance is suggestive of myasthenia or myopathy. The electrical reactions, however, are normal, and there is no myasthenic nor myotonic reaction. Chest: No physical signs; the pectoral muscles equally feeble, but not wasted. Spine: General kyphotic curve. Abdomen: Recti very feeble. Legs: No obvious wasting, but both rigid in extensor position; all muscles are almost paralysed, except the adductors of the thigh, which are fairly good. Gait: Child cannot stand without much support, tends to fall in a heap helplessly, but when supported can make the movements of walking very clumsily and inefficiently. Sensation is in no way altered from the normal to all forms of stimuli. Reflexes: Upper extremities all brisker than normal; abdominal and epigastric absent. Lower extremities: Knee-jerks much increased; double ankle clonus and plantar responses extensor. Wassermann's reaction in blood is positive.

The child has been treated with potass. iodid. and mercurial inunction, and one month after admission an injection of 0·4 grm. salvarsan (Joha's method), with some improvement. About seven days after this the cerebrospinal fluid Wassermann reaction was negative.

The condition is probably one of progressive double hemiplegia of cortical situation. The diagnosis appears to be either juvenile general paralysis or cerebral specific disease.

Dr. PARKES WEBER said that if the presence of congenital syphilis were certain, he saw no reason why the case should not be called one of juvenile general paralysis. Many cases which were included by general consent under the heading "juvenile general paralysis" showed certain symptoms which might be due to actual syphilitic disease of the brain or meninges. Children did not necessarily exhibit the typical mental symptoms met with in most adult cases of the disease.

A Case of Friedreich's Ataxia in an Undersized Girl, aged 10.

By JAMES TAYLOR, M.D.

(Shown by Dr. BIRLEY.)

THE patient had four brothers and five sisters alive and well, the parents are healthy, and the only evidence of any familial tendency is the statement that a first cousin on her mother's side could neither walk nor feed himself, and died before he was aged 20. Has always been a small, weakly child. There is a history of fifteen months' progressive difficulty in walking, sitting, and getting up off the ground, with some gradual changes in the shape of her feet. The child is now aged nearly 11, and is chiefly remarkable for her diminutive size; height, 3 ft. 8 in. The face is narrow and literally tiny, even compared with the rest of her body; the features are thin and sharply cut, the expression bright and possibly a little old. Viscera healthy. Slight scoliosis when sitting, which disappeared entirely on extension. Bilateral clubbed foot with toes in characteristic Friedreich position. Quite intelligent. Vision and optic disks are normal. Occasional irregular nystagmus on lateral movements, which is not always present.

The body is small and narrow; the limbs small, but well proportioned. The muscles are everywhere small, but there is no local wasting or hypertrophy. Moderate generalized weakness of trunk and limbs with some hypotonia and slight asynergia. Manner of rising from the sitting or lying positions into upright posture is suggestive of that seen in myopathic disease. All muscles react to faradism. No sensory loss or sphincter impairment. Gait unsteady; has difficulty in maintaining her equilibrium. Reflexes: Arm-jerks absent; abdominals present; knee- and ankle-jerks about normal; plantar indefinite, but more extensor than flexor; no clonus.

Patient has improved considerably under treatment, and the possibility is suggested that, in addition to the spinal cord changes, there may also be a superimposed pathological change in the muscles of a diffuse character.

Sections of Neurology and Ophthalmology.

COMBINED MEETING.

March 5, 1913.

Sir ANDERSON CRITCHETT, Bt., C.V.O., President of the Section of Ophthalmology, in the Chair.

DEMONSTRATION OF CASES OF DISEASE OF THE PITUITARY BODY.

Notes of Three Cases.

By H. L. EASON, M.S.

CASE I.

D. B., AGED 30, an actor, noticed a defect in the sight of the left eye in October, 1905. He attended an ophthalmic hospital in London, and was told that nothing was wrong. The vision remained defective in the left eye and the right began to fail, so he revisited the hospital in December, and saw another surgeon, who told him that he had atrophy of the nerve, and ordered him iodide of ammonia. Sight in both eyes still diminished, and in January he attended an eye hospital in the West of England, where he was again told that he was suffering from optic atrophy. In the same month he attended another ophthalmic hospital in London, where optic atrophy was once more diagnosed, and he was again ordered iodide of ammonia. Vision still failed progressively, and by February the left eye was almost blind. He attended a general hospital in London, and also consulted privately an ophthalmic surgeon, and was told on both occasions that he was suffering from optic atrophy. By March his sight was so bad that he had to be led about. In the latter part of March, 1906, he was admitted to Guy's Hospital under my care.

On admission he suffered considerably from headache, mostly frontal. His eyes had a fixed vacant expression, and the pupils remained dilated even in a comparatively bright light. He was a dark, short man, with a pale complexion, stout, and apparently in good health, with no signs of acromegaly. He was not impotent, but had noticed recently that sexual desire was diminished. On ophthalmoscopic examination it was observed that the optic disks in both eyes appeared pale, but that there was no evidence of previous neuritis, and the vessels were of normal size. His vision was so defective that he could hardly see hand movements except under the most favourable conditions of light, and he could not walk without being led.

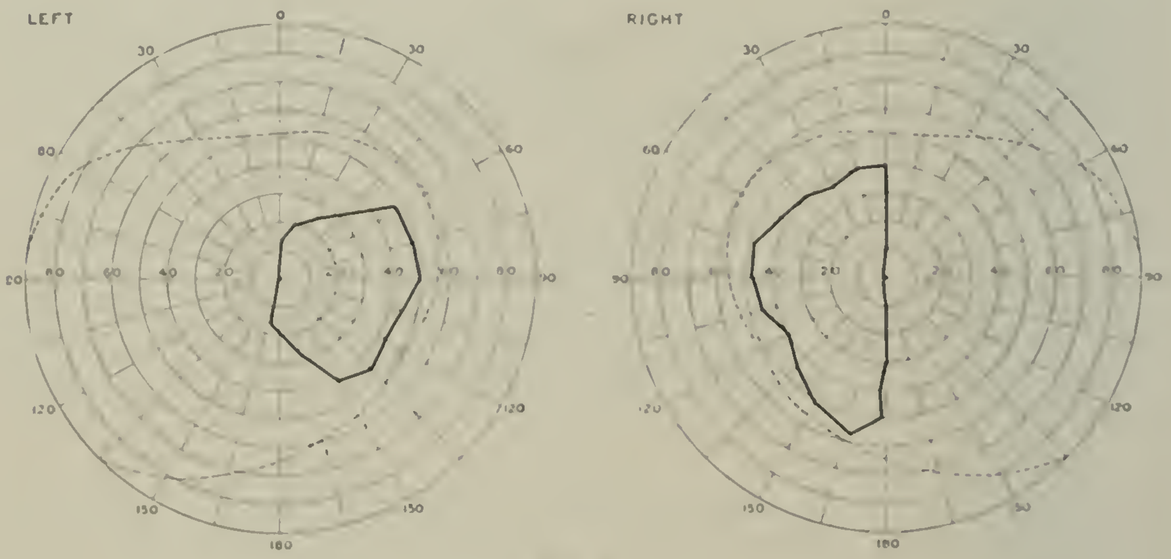


Fig. 1.

D. B., April 2, 1906.

It was impossible to chart the fields of vision on a perimeter, but from an examination with lights and large objects it appeared that what vision he had was limited to the nasal half of each field. In view of the history and the bilateral temporal hemianopia, symptoms suggesting rapid enlargement of the pituitary body, he was given thyroid gland extract, 5 gr. three times a day.

The treatment with thyroid gland began on March 27, and by April 2, only a week later, the vision had improved to such an extent that the fields of vision could be charted (fig. 1). At that time it was noted that the hemiopic pupillary reflex was quite distinct. The patient's vision steadily improved, and by April 17 the fields of vision had improved to the extent shown in fig. 2. By April 27, just one month after the commencement of the treatment, the sight of the right eye had improved to $\frac{6}{6}$, and that of the left eye to $\frac{3}{60}$, while the temporal side of the right field of vision had commenced to clear (fig. 3).

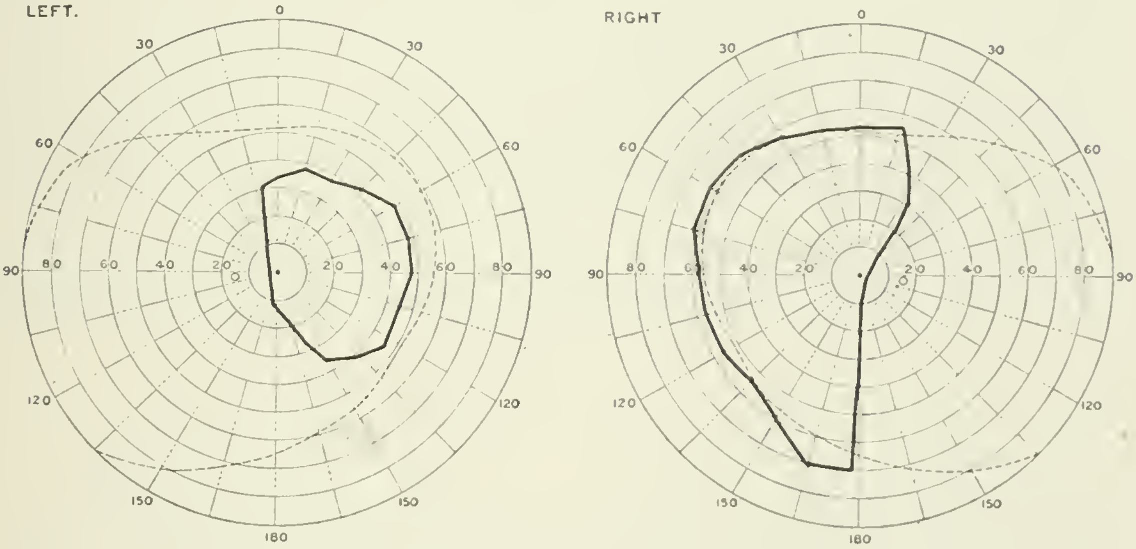


FIG. 2.

D. B., April 17, 1906.

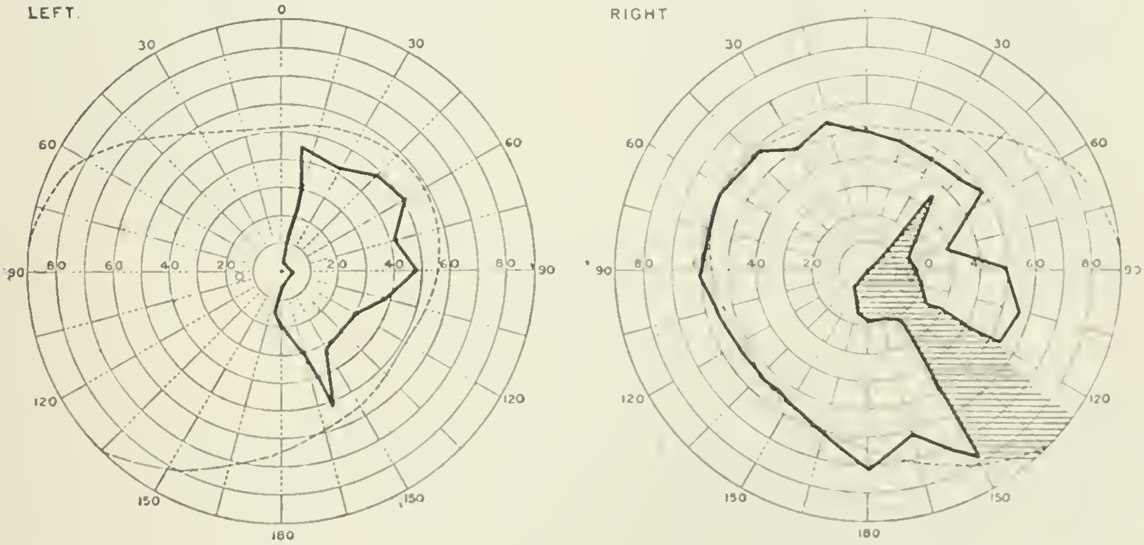


FIG. 3.

D. B., April 26, 1906.

This improvement continued, and by May 8 there were only two large paracentral scotomata and some limitation of the temporal field in the right eye (fig. 4). At this time he was discharged from the hospital and continued to take thyroid extract regularly. In November, 1906, the vision of the right eye was still $\frac{6}{6}$, and the field of vision was nearly full, with no scotomata. The vision of the left eye was $\frac{6}{60}$, and the temporal half of the field remained blind (fig. 5).

The vision in both eyes remained unaltered for five years; he occasionally tried to leave off the thyroid extract, but abstention was always followed by headache and mistiness of vision, so he determined to continue without intermission. In June, 1911, he was shown at the Clinical Meeting of the Association of Physicians in London, and at that time his sight was in all respects as good as it was in the November five years before. Since that time he has gone to South America as an agent for a gramophone company, and I have not seen him again.

This case is interesting in that the symptoms suggest a rapid growth of the pituitary body similar to the parenchymatous enlargement of the thyroid gland. The duration of the disease was either too short to produce symptoms of acromegaly or, as the diminished sexual functions might suggest, the enlargement of the pituitary gland was associated with diminished rather than excessive secretion. The recovery of vision was little short of miraculous, and, if it were not for the cloud of witness as to the man's condition beforehand, might almost be considered incredible.

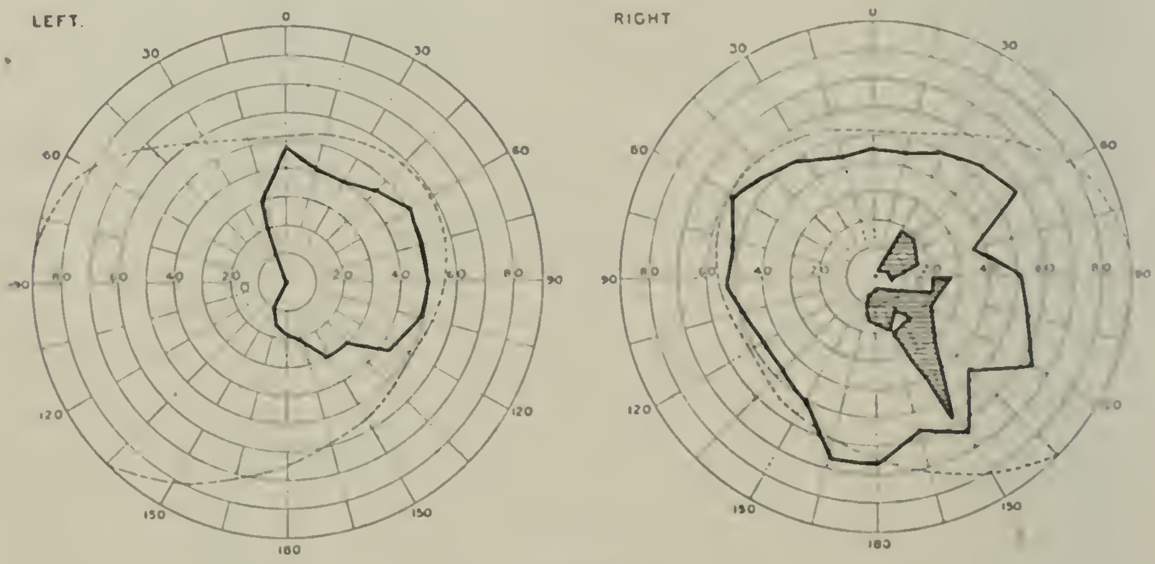


FIG. 4.

D. B., May 8, 1906.

It certainly seems worth while to try the administration of thyroid gland extract in all cases of pituitary tumour, as no doubt a certain number are due to a condition similar to that causing the symptoms exhibited in this case.

CASE II.

Mrs. A. B., aged 52, was sent to see me by Dr. A. F. Hertz, on November 29, 1912. Her vision had been slowly failing for over two years, and a defect had been noticed in the visual field since November, 1910. She had been twice to Wiesbaden for a course of mercurial treatment under Professor Pagenstecher, but the vision steadily deteriorated. She had not been able to read a newspaper for nearly two years, and lately had found increasing difficulty in seeing even large objects, though she was still able to write.

On examination it was found that there was definite temporal hemianopia in both eyes, the blind area apparently involving the macula to some extent. Vision: R., $\frac{6}{60}$; L., $\frac{6}{60}$; in both cases, with eccentric fixation. Both optic disks were pale, though not entirely without colour. The patient had been increasing in weight, having put on 3 st. in the last five years. Menstruation ceased a year ago. She complained of frontal headache, chiefly on the right side, but not of occipital pain. Her memory was still excellent, and she suffered from insomnia rather than drowsiness. There was no cyanosis, or evidence of acromegaly. The fields of vision are shown in fig. 6.

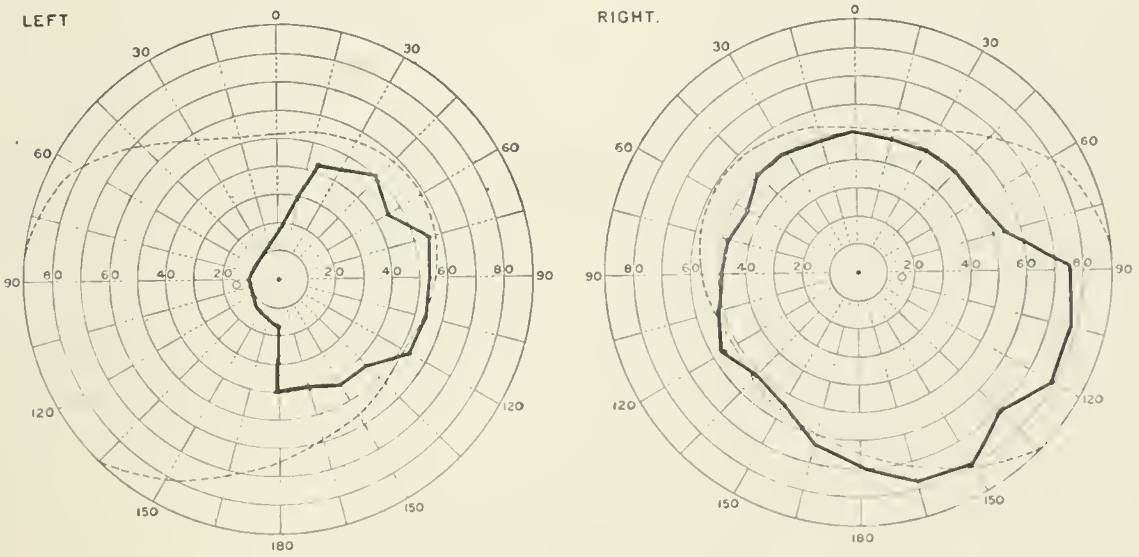


FIG. 5.

D. B., November 12, 1906.

From the history and symptoms it was evident that there was an enlargement of the pituitary body. As mercurial treatment had failed to relieve the symptoms it was decided to try the effect of thyroid extract, and the patient accordingly commenced to take 5 gr. three times daily. By January 17, 1913, vision had improved considerably, both as regards central acuity and peripheral vision. The patient had noticed that after taking thyroid for three weeks she could read the words on her bath-taps, which she had not previously been able to do, and by January 17 she was able to tell the time by her small wrist watch, a thing she had been unable to do for two years. With a + 4D. sph. she could read J8 slowly. Vision: R., $\frac{6}{36}$; L., $\frac{6}{60}$. The fields of vision in both eyes were distinctly larger, and showed a definite tendency to enlarge towards the temporal side (fig. 7). The patient's weight had diminished by over 5 lb. since the commencement of the treatment, and the headaches were less frequent and severe. She left London for abroad the day after I saw her.

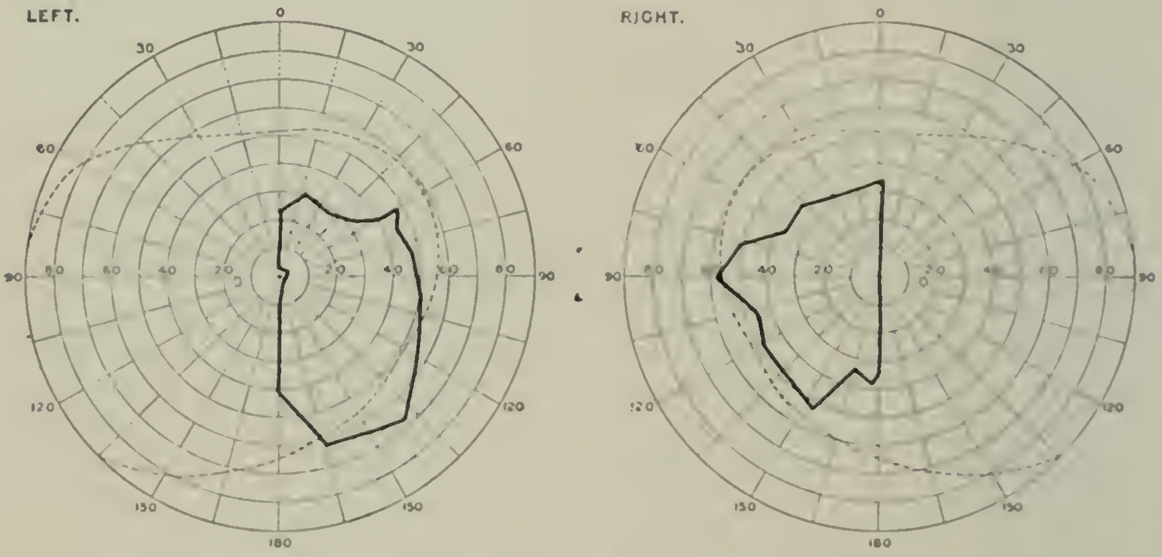


FIG. 6.

A. B., November 29, 1912.

In this case the duration of the disease was much longer than in the previous one, and it is unlikely that the nerve-fibres at the chiasm will ever recover completely after sustaining pressure for two years. Nevertheless it was interesting to note that thyroid gland was the only treatment that had arrested the progressive diminution of sight, and that improvement occurred for the first time since the vision began to fail.

The affection of the pituitary body, whatever it might be, was probably similar to that in the previous case.

CASE III.

E. W., aged 27, butcher. In 1910 the patient first noticed failure of sight on one side of the field of vision in both eyes. The loss of sight seemed to come on suddenly, and had not progressed, so far as the patient could tell. He had constant vertical headache and occasional "fits," with no vomiting or vertigo. There was no albuminuria, polyuria, or glycosuria.

Condition on admission to Guy's Hospital in March, 1911: Eyes apparently normal with the exception of some pallor of the optic disks. Vision: R., $\frac{6}{36}$; L., $\frac{6}{9}$. Complete bilateral hemianopia Knee-jerks absent; thyroid isthmus present. Skin dry and hair dry and scanty. The patient is short and undeveloped, not looking anything like his age. Voice half broken and high pitched. No hair on face; testicles normal, but very little pubic hair. Sensation normal. Extremely drowsy and sleeps a great deal; when urged to do so he gets up for a few minutes but soon returns to bed. Face cyanosed and pigmented, resembling Addison's disease to some extent. Blood normal; blood-pressure 100. Wassermann reaction positive. A skiagram shows some enlargement of the sella turcica. Weight, 7 st. 10 lb.

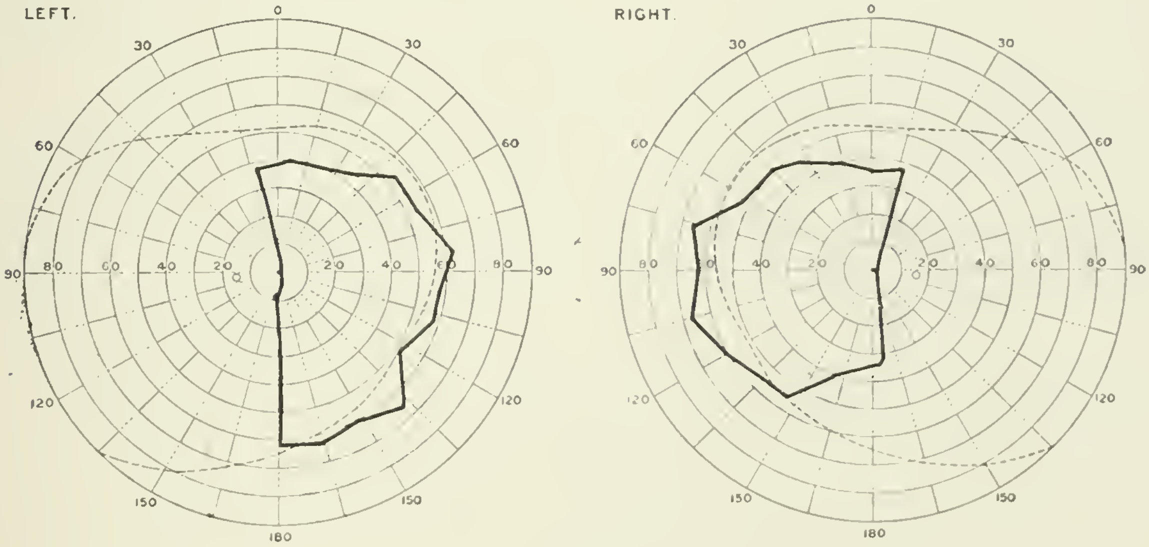


FIG. 7.

A. B., January 17, 1913.

The patient has now been under observation for two years and his condition remains practically unchanged. He has been given courses of treatment with mercury, iodides, thyroid and pituitary extracts, with no result on vision, though the headaches are relieved and his general condition improved with pituitary extract. His weight has increased to 8 st. 6 lb.

The field of vision for colours was tested in the right eye on February 14, 1913, and showed some diminution of the field for blue (fig. 8). Green was only recognized as such just at the fixation point. and red was called brown whenever recognized as a colour. The fields both for red and green were too small to chart.

The patient, with his drowsiness, imperfect sexual development, and cyanosis, with absence of all symptoms of acromegaly, exhibits the symptoms of hypopituitarism, or Fröhlich's syndrome. As the visual defect is not increasing and the patient's condition remains unaltered, it has not been considered justifiable to attempt to remove the pituitary tumour, and treatment has been confined latterly to the steady administration of pituitary extract.

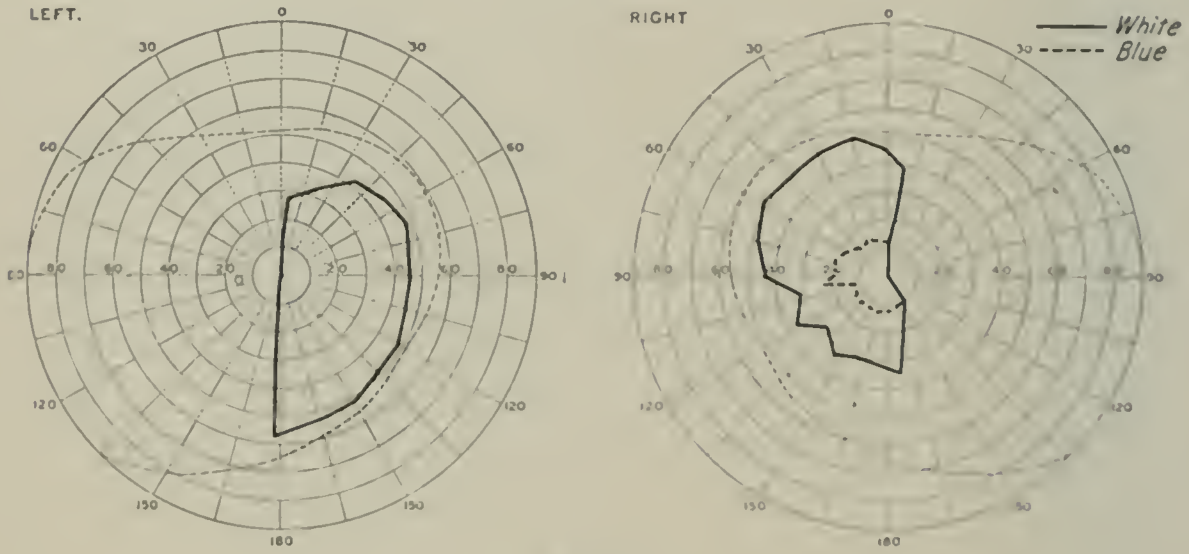


Fig. 8.

E. W., February 14, 1913. (Red and green too small to chart.)

Pituitary Tumour with Symptoms of Dystrophia Adiposo-genitalis.

By Gordon Holmes, M.D.

A. M., A GERMAN clerk, aged 21, comes of healthy stock. He was healthy and apparently well developed till about December, 1909. Then he found he could not see to the right with his right eye; at this time its central vision was apparently good, but it soon began to fail rapidly. Before he became completely blind in this eye in August, 1911, he says he could see objects to the left with it, but not what he looked directly at. He was first seen in November, 1911. Then his right eye was quite blind, but the visual acuity and the visual field of the left eye were normal. He had never much hair on his face and has only shaven occasionally. He became considerably fatter from the time he first noticed failure of vision. He has suffered much with severe headaches, and has occasionally had attacks of vomiting, but these had been less severe and frequent latterly.

Present state: The patient looks several years younger than he actually is. He is now much less fat than he was some months ago, but is still plump. He has very little hair on his face or in the axillæ; there is a fair amount of pubic hair but it runs horizontally across the abdomen as in the female. His figure, too, resembles that of the female, the hips being broad and the pelvis tilted. His penis is small, but his testicles are fairly well developed. He states that he has actually no sexual desire, and has had no erections for the past three years or so. Very rarely he has nocturnal emissions. He shows no trace of acromegaly or gigantism. His right eye is blind and the optic disk is very white. In the left eye he has $\frac{6}{6}$ vision and the optic disk appears normal. The visual field to white is not contracted, but there is now an indefinite partial scotoma to the temporal side of the fixation point; in the same region there is a complete scotoma for red and blue, while green vision is lost in the whole of the temporal half of this field almost up to the fixation point. Lately the right eye has appeared more shrunken in than it formerly was. A skiagram of the skull shows a very much enlarged sella turcica.

A Pituitary Tumour with Early Acromegaly.

By Gordon Holmes, M.D.

R. D., now aged 36, married at the age of 21, and had two healthy children, and afterwards one miscarriage. In May, 1910, she began to suffer with headaches and pains over her eyes, and soon after this she noticed the vision of her left eye was blurred; it became rapidly worse. In July, 1910, vision began to fail in the right eye too. Headaches continued up to the time she was seen in December, 1910; at first they were occipital and vertical, but later became frontal. When the headache was severe she felt some nausea but had no vomiting. From the onset of her symptoms she suffered with heavy bearing-down pains and a dull aching in her legs. Menstruation ceased about the time vision became affected and has never returned; she has also lost all sexual desire and her breasts have become smaller. She has not increased in height, but has become more "long-waisted" and her feet and hands are larger than they were; she requires larger gloves and boots than formerly. Her teeth used to meet in a natural manner, but now those of the lower jaw project beyond those of the upper. Her husband says her chin "looks bigger" than it was. The upper jaw has probably not altered in size, as the plate she has worn for the past twelve years still fits well. Her face has altered as well as her figure: this is chiefly due to an increase in size of her nose. In the early part of the illness she lost a good deal of hair. During the past two years there has been a definite increase in the size of her hands and feet, but no other obvious skeletal change. Her tongue has also become remarkably large.

In December, 1910, vision of the left eye was $\frac{6}{24}$ with temporal hemianopia, and a central scotoma for colours. In the right eye there was a large central scotoma with complete absence of colour vision. In April, 1911, the nasal portion of the right central scotoma had disappeared, leaving a temporal paracentral scotoma for white and colours with $\frac{6}{18}$ to $\frac{6}{12}$ central vision; in June vision was $\frac{6}{9}$ and in October, 1911, partly $\frac{6}{6}$. The paracentral scotoma gradually diminished, and on the latter date was complete only for red and green. Lately it has increased, but central vision is still $\frac{6}{9}$. The vision of the left eye has deteriorated within the last few months to $\frac{6}{60}$, and the field is becoming smaller.

A skiagram shows enlargement of the sella turcica.

She has been treated with thyroid extract; while taking it she has lost weight and has had much less headache.

Two Cases of Bitemporal Hemianopsia, with other Evidence of Pituitary Tumour.

By N. Bishop Harman, F.R.C.S.

Case I.

Mrs. C. came to me in 1910 at the instance of Dr. Pennington. Her complaint was that for the last two years she had noticed a mist before the right eye which she felt she wanted to brush away; recently the left eye had ached. The superficies of the eyes were normal. Retinoscopy showed only a minimal degree of astigmatism. R.V. $\frac{6}{36}$, L.V. $\frac{6}{6}$ partly, not improved by glasses. Examination of the fundi showed marked pallor of the right disk, and a lesser degree of pallor of the left disk. Examination of the fields of vision showed complete loss of the temporal half of the right field and relative insensibility of the temporal half of the left. That is, there was bitemporal hemianopsia or blindness of the nasal halves of each retina and those fibres of the optic nerves that cross over at the chiasm. Pressed as to the earliest sign she had had of failure of vision, a very interesting experience was elicited. She remembered that two and a half years ago (the spring of 1908) she had dozed in her garden; on waking, she "noticed a bed of bright-coloured tulips on her right side seemed to have vanished, and by and by they came back again." This observation of hers is in strict accordance with ascertained clinical symptoms—the failure of colour sensibility as an early symptom of defect of the optic nerve.

The patient is a slim, healthy-looking young woman. She is at this date aged 32. She is the mother of two children, a girl aged 10 and a boy aged 9. In 1907 she had uterine curettage: since then she has had no indication of conception. She has now a tendency to delayed menstruation; the periods may be seven to ten days behind time, and she says that during this period of suspense she feels particularly well and has no sense of discomfort in her eyes.

Careful inquiry indicates no recent change in her features or limbs; she has strongly marked features of almost Hebraic cast, but she and her husband say that she has always been so. This is confirmed by a photograph taken when she was aged between 17 and 18. She takes the same sized gloves and boots as heretofore, and can give the size number without hesitation.

The case has been under observation at frequent intervals since the date of the first examination, and I have had the advantage of the investigations and reports of my colleagues at the West London Hospital. Dr. Bernstein found the Wassermann reaction negative. Dr. Grainger Stewart examined her twice. He found no loss of pubic or axillary hair; and except for a slight diminution of the abdominal reflex, no sign of nerve disorder beyond the loss of visual fields. Dr. Davis found the nose and pharynx quite healthy. Dr. Reginald Morton took X-ray photographs of the skull in 1910, 1911, and again this year. There is an enlargement downwards of the pituitary fossa with attenuation of the dorsum sellæ (fig. 1).

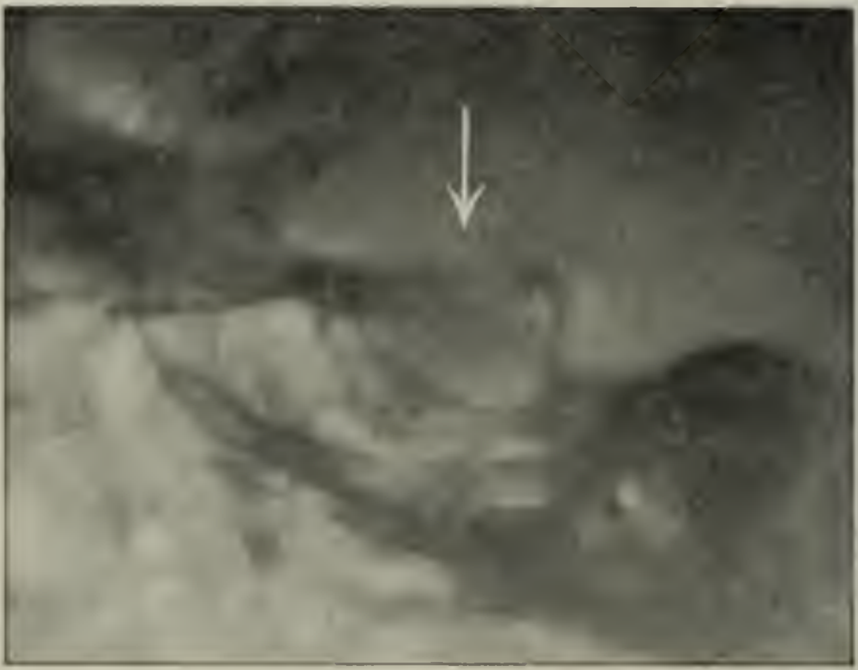


Fig. 1.

Mrs. C., February, 1913. Frontal region to left.

At the first examination of the fields, the temporal half of the left field was responsive to the test with a 20 mm. white card, but was quite blind to any sized red test card. At the present date there is still some fleeting sensibility in this part of the field to white. On some days it is possible to map out the periphery to nearly the full extent with a 20 mm. white square, but a few minutes later there will be a total lack of sensibility to a sheet of white paper 200 mm. square (fig. 2). There is no doubt of the accuracy of the observation, for the patient can locate the test object with the finger when the perception is good. On occasions she states that the sheet of paper gradually disappears from her field of vision, though it has not been moved. Visual acuity remains unchanged in the left eye, it is now $\frac{6}{6}$ for a few letters; but the vision of the right eye has declined from $\frac{6}{36}$ to $\frac{4}{60}$.

During the whole period of observation she has been under treatment with thyroid extract. The treatment has been intermittent. She takes 15 gr. a day for a fortnight, and then stops them for a week. The patient is convinced that she feels a distinct improvement in her sense of well-being when she resumes the tablets after an interval, but I have not been able to confirm this by any definite reaction to tests. The disks are distinctly white, the right much more so than the left; also the right retinal vessels appear to be smaller than normal. There is no suggestion of changes such as are associated with post-neuritic atrophy, there is atrophy pure and simple. On one or two occasions in recent months there has been very fair response to the Wernicke's hemiopic pupil test in the right eye, but there has been no indication thereof in the left eye.

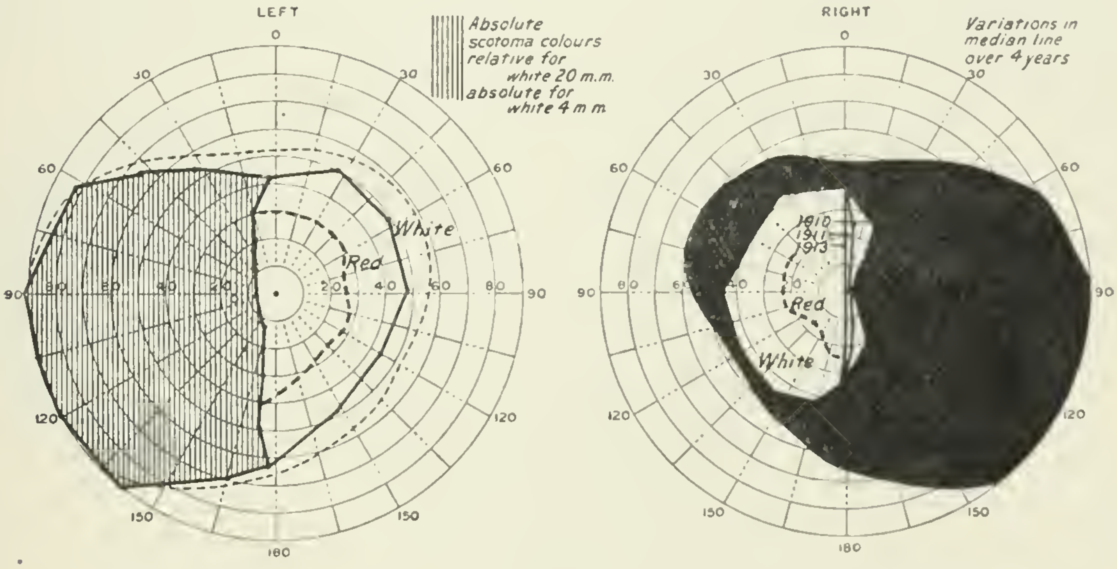

LEFT
0
30
30
60
60
90
90
120
120
150
150
180
80
60
40
20
20
40
60
80
White
Red
Absolute scotoma colours relative for white 20 m.m. absolute for white 4 m m
RIGHT
0
30
30
60
60
90
90
120
120
150
150
180
Variations in median line over 4 years
1910
1911
1913
Red
White

FIG. 2.

Mrs. C., aged 30 (1910). Repeated 1911, 1913.

CASE II.

Mr. G. B., a gardener, was sent to me early in 1911 by Dr. Bentley. He said he could not see properly with the left eye. He had particular difficulty in seeding and budding; on occasions he saw double when looking through leaded glass windows. He was a large, heavy man, with a pale, flabby face suggestive of renal trouble. He said he had frequent pain in the back, passed thick water, and had to get up at night.

On examination with the retinoscopy mirror, no obstruction to vision was seen save a few peripheral lens opacities in the right eye. Retinoscopy showed the eyes were emmetropic. When he was turned to the Snellen's test, the diagnosis of the condition was made instantly and in a manner I have never before witnessed in such striking fashion (fig. 3). The man began with the top large single letter and read with the right eye down to $\frac{6}{9}$, but naming only the letters on the left half of the card; and with the left eye he read down to $\frac{6}{18}$, but naming only the letters on the right half of the card. It was at once evident that he had bitemporal hemianopsia. This was confirmed when recourse was had to the perimeter; there was found complete loss of sensibility on the left temporal field, a total loss of sensibility on the right temporal field to colours, and a reduction of sensibility to white (fig. 4). The left optic disk was distinctly pale, and there was some slight loss of colour in the right disk.

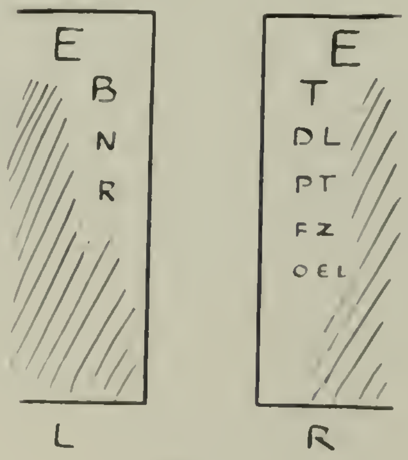


FIG. 3.

Mr. B., 1911. Manner in which Snellen's test types were read with each eye separately.

The patient is now aged 48, but looks older. He stands 5 ft. 10¼ in. high, and weighs 16 st. 7 lb. He is quite sure that he takes the same sized boots as he has done for many years. This year he thought his fists might be larger, for there had been some difficulty in getting them through his shirt sleeves. He has been married twice. By his first wife he had one daughter, who is now aged 23; there were no miscarriages. To his second wife he has been married thirteen years; there has been no conception. For the last two or three years he has lost sexual desire.

This patient has been re-examined at intervals, and no change has been observed in his condition either by his own doctor or by himself. He has been under a definite scheme of treatment without interval for the two years, and there has been no diminution in vision either as regards acuity or field. In February of this year he read with the right eye $\frac{6}{9}$ three letters, and with the left $\frac{6}{24}$ with a letter in $\frac{6}{18}$. His fields are almost identical with those taken in 1911; he still has some perception for white in parts of the right temporal half, but there is no sensibility to colours. He continues his gardening, and can do a good day's work. He still says he sees double on occasions, usually when he is looking through leaded windows, but sometimes when looking into the distance. Examination of his ocular muscles indicates no weakness or limitation of movement. Double images can never be obtained. It is possible that there is pressure on one or other of the sixth nerves as they pass by the dorsum sellæ. I am inclined, however, to think that the symptom he experiences is akin to the production of diplopia by means of the diaphragm test. When that test is so arranged that the test card, exhibited to the eye through the hole in the screen, is exposed one half to the one eye and the other half to the other eye, diplopia will be easily induced by any lack of mental attention, even when there is the

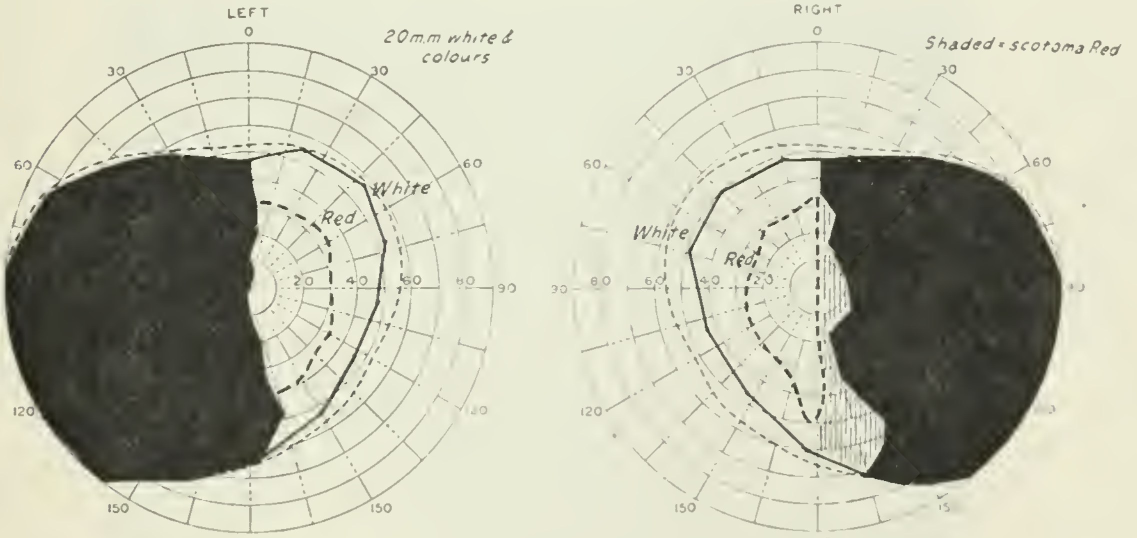


FIG. 4.

Mr. B., aged 45 (1911). Repeated 1912, 1913.

most perfect binocular vision; any heterophoria exaggerates the liability. The field of vision that this man gets in his condition of bitemporal hemianopsia is exactly like the state of one's vision when looking through the screen of the diaphragm test; there is crossed vision with a union or bare overlapping of the fields in the vertical line; a very little disturbance of the medium through which vision is obtained (such as leaded glass) would cause separation of the joined nasal fields and the sensation of double vision would ensue.

Artificial glycosuria has been attempted in the case of this man. He was given at intervals during four hours on an empty stomach 500 grm. of commercial dextrose; a sample of the bulk of urine passed during that day was examined but no trace of sugar was found.

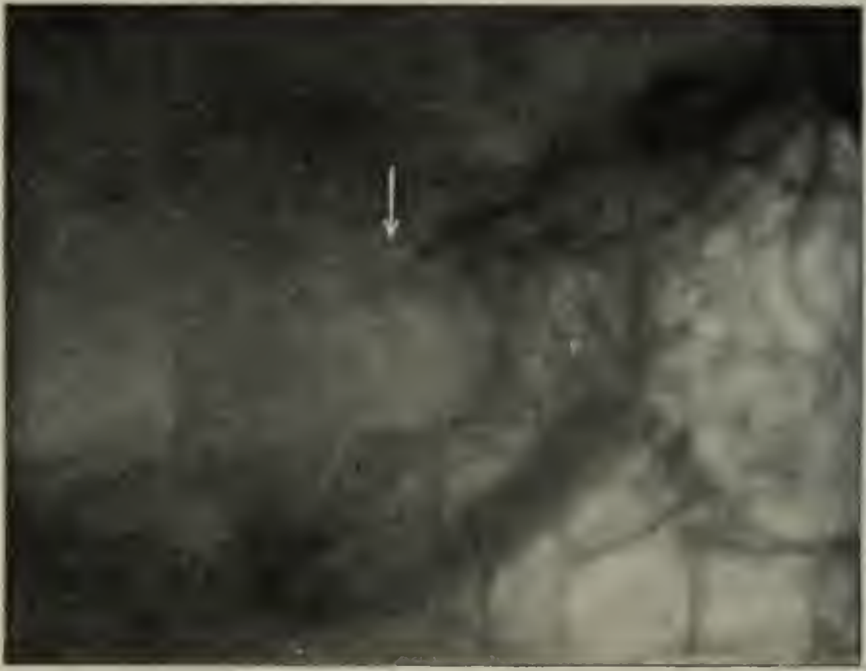


FIG. 5.

Mr. B., February, 1913. Frontal region to right.

X-ray pictures of the patient's head have been made on two occasions, and the condition of the pituitary fossa is most distinctive (fig 5). Instead of the outline of a fossa, there is that of a broad, capacious bay which measures 23 mm. from horn to horn. Its outline forms almost exactly the half of a circle whose radius is 12 mm. There is no dorsum sellæ, the posterior horn of the bay is no more pronounced than the anterior.

The treatment that this man has had presents some novel features.

He lives in the country where the slaughterhouse is easy of access. It occurred to me that it would be worth while trying the effect of regular feeding with the raw pituitary gland obtained directly from the freshly killed animal. He was shown the site of the little body that he was to eat, and appears to be able to extract it like a periwinkle from its shell and eat it with the addition of a little condiment. Of his own initiative he carried the idea further by eating largely of cooked brains!

These two cases are quite typical of the class of case under discussion. Each has some one or more feature of interest. The woman has her personal observation of the early loss of her colour perception over the affected area of the field of vision. The man shows in a marked degree the sharpness of the division of the sensitive and insensitive areas of his fields, even close up to the point of fixation, in the ordinary test for visual acuity with the Snellen's types; and there is the symptom of diplopia, for which I have suggested an explanation other than that of a muscle defect. Both have been under observation for a fairly long period, and show very little change. The treatment adopted has been different, but whether or no the treatment adopted in either case has had any or no effect is not possible to determine. With the symptoms remaining stationary and without serious discomfort to the patients there is no indication for operative interference.

Case of Pituitary Disease.

By THEODORE THOMPSON, M.D.

A. F., AGED 32, clerk. Three years ago went to an optician's and was fitted for glasses. Two years ago went to Moorfields Hospital; given glasses, and a physician gave him thyroid tablets. Lost 16 lb. in weight. Sight improved. Six months ago sight gradually got worse again.

Previous health: Sore on penis followed by bubo and abscess of groin. No rash or sore throat afterwards (nine years ago). Married, four children. Small, undersized man.

Present condition: Bitemporal hemianopsia. Height, 5 ft. 3 in.; weight, 8 st. 7 lb. Disks pale. No signs of acromegaly. Urine: 1018, no albumin, no sugar. Blood-pressure, 130 mm. Hg. Scar on penis and in groin. Wassermann negative. X-ray shows greatly distended and enlarged sella turcica.

Pituitary and (?) Adrenal Syndrome.

By H. G. TURNEY, M.D.

A. O., AGED 24, admitted into St. Thomas's Hospital on May 20, 1912, for amenorrhœa of five years' duration.

On admission: Appearance that of intense plethora, the colour of the cheeks being a deep red. Pressure in brachial artery 200 mm. of mercury. Blood count, 8 million red cells; otherwise normal. Marked tendency to purpura, but only into the cutaneous tissues of the limbs. Obesity limited to the trunk and face, the limbs being somewhat wasted. X-ray examination shows expansion of sella turcica. No affection of vision and no nervous symtoms. Sugar tolerance normal. Pelvic organs atrophic, but otherwise without disease.

(For full report of this case, *see* p. lxx.)

Precocious Development in a Boy, aged 8.

By F. J. POYNTON, M.D.

IT is advisable to state that this case is shown with a definite realization that many of this type are looked upon as associated with

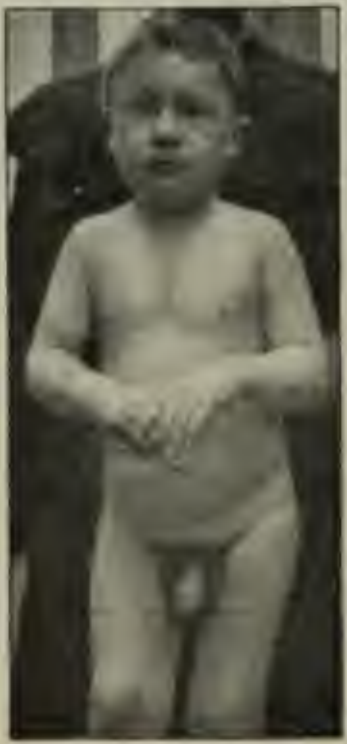


FIG. 1.

Photograph taken at the age of 3 years 4 months.

carcinoma of the suprarenal. Dr. Poynton has had this patient under his observation since he was aged 2½. He is now aged 8, and the entire absence of any evidence of suprarenal tumour, and the boy's facies, led him to show the case for diagnosis. The first child of healthy but small parents. He was healthy except for a "feverish cold" in the first year. After this he began to grow very fast. Sexual development and pubic hairs were developed at one year. At the age of 2 years 6 months his weight was 3 st. 1 lb.; circumference of head, 20 in.; thorax, 22½ in.; abdomen, 23 in.; height, 3 ft. 5 in.

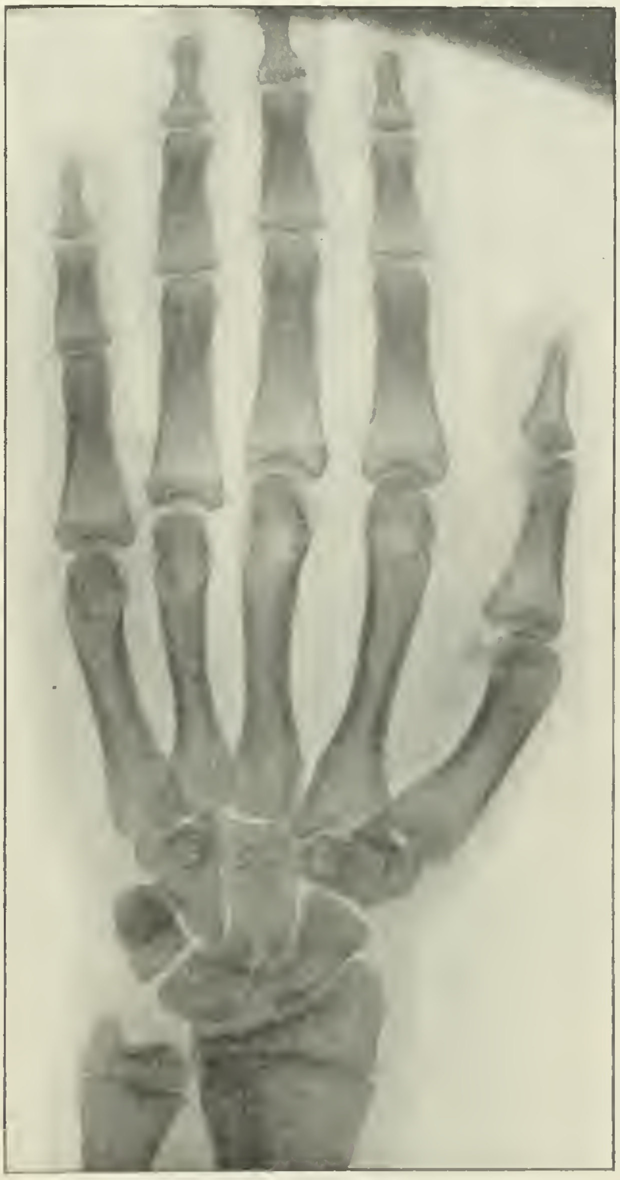


FIG. 2.

Skiagram of carpus showing advanced ossification.

At the age of 3 years 4 months his weight was 3 st. 13¾ lb.; his height, 3 ft. 8 in. He had a deep voice, was emotional, but had shown no sexual propensities. The ossification of his carpus corresponded to a boy aged 13.

Since that time this remarkable development has hardly kept pace with the earlier years, but the boy has now a well-marked moustache and a downy beard and whiskers. His frame is almost paternal in its back view, both in breadth and depth. His legs are not in accord with the upper part of his frame but are comparatively small. He is a quiet, modest boy, not over sharp, but quite sensible and good-tempered. He has never had a day's serious illness. The X-ray pictures by Dr. Ironside Bruce show the advanced ossification (fig. 2). His heavy features are rather suggestive of pituitary affection. The blood-pressure has not been remarkable. His sight is good. The sexual development has been a feature of the case, but there has not been any trouble with the boy. He is remarkably strong for his age.

Case of Pituitary Tumour.

By T. Grainger Stewart, M.D., and Herbert Parsons, F.R.C.S.

W. W., aged 51. Complaint, failure of vision; duration, sixteen years.

Family history good; one daughter alive and well; one child died, aged 6 months, of marasmus; wife died after second childbirth.

Previous health: Rheumatic fever at the age of 7; denies venereal disease.

Present illness: Sixteen years ago (aged 35) gradual onset of failure of vision in right eye; noticed first in the temporal field. Eight years ago pain in right eye, sight much worse in that eye, and gradual loss of vision in left eye (temporal field first). Two years ago, nose-bleeding coming on in attacks. In addition to the above changes the patient has become very adipose, his colour rather pale and waxy. His face has become "fuller," his hair rather thin and coarse on the head and has disappeared from the axillæ and diminished over the pubic region. Tendency to regression towards feminine type. Adipose breasts and loss of hair above pubis. Sexual desire and power have steadily diminished. Hands have increased in size. Sugar tolerance increased.

Present state: Cranial nerves—In addition to general features described above there is primary optic atrophy in both eyes. Vessels

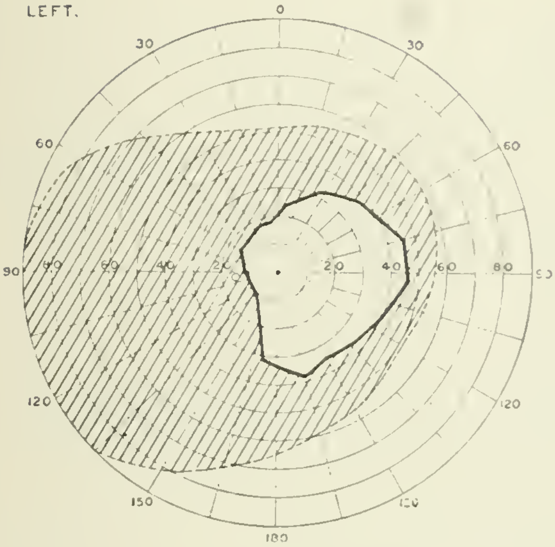


FIG. 1

W. W., May 10, 1911.

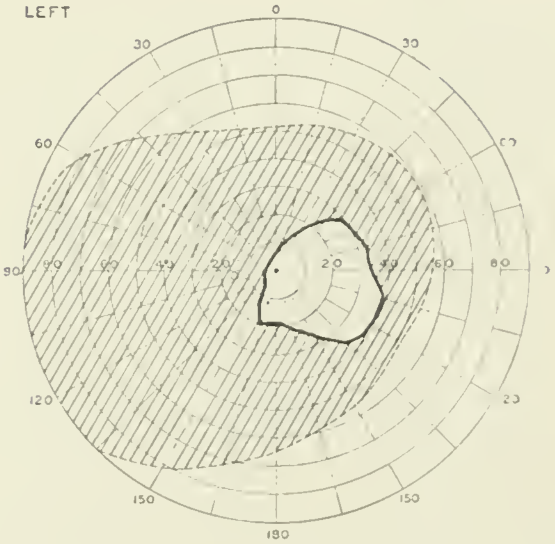


FIG. 2.

W. W., February 12, 1913.

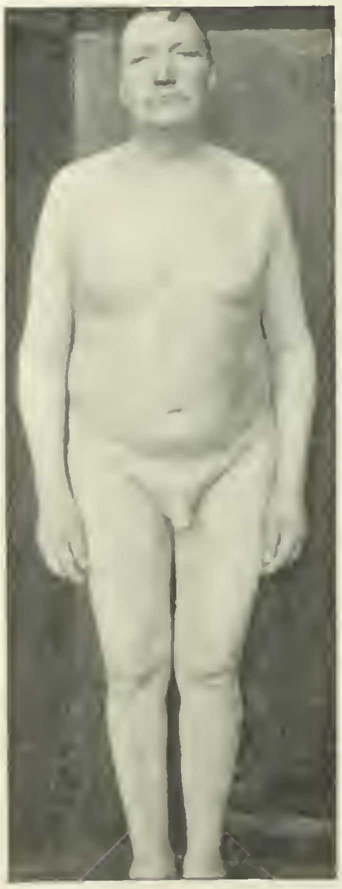


FIG. 3.

fair size. Visual fields—left lost on temporal side, diminished on nasal in left eye (right eye no vision). Right pupil just reacts to strong light; left reacts. Occasionally some divergent strabismus—otherwise nerves normal. Motor—no motor paralysis. Sensory—no sensory loss. Reflexes—deep, all present and equal; epigastric and abdominal—diminished; plantars—flexor. Sphincters—not affected. Wassermann—normal. X-ray—enlargment of sella turcica.

A Typical Case of Acromegaly, with Signs of Regression.

By S. A. Kinnier Wilson, M.D.

E. F., aged 27, male, was under the care of Dr. Thomas Buzzard at the National Hospital, Queen Square, in the summer of 1906. The history of the case obtained from the patient in that year is as follows: Family history and previous life of the patient showed nothing of any importance. It was between the ages of 16 and 19 that the growth of the patient's trunk and extremities became really noticeable; it progressed steadily though slowly. During these years his lips became thicker; the hair of the scalp became more luxuriant, but it is interesting to record that up to this year (1906) he had shown no signs of developing a moustache, and shaved only once in three months. The voice also became deeper. The "hump" on the back began to show itself about 1905. About Easter, 1905, when out one day in the open country, he found that when looking into the sky at larks he lost sight of them almost at once, although they were near enough. He thought this was due to a "cold," but this dimness of vision when fixing an object steadily continued. In August, 1905, he found he could not see things to the left with the left eye, but is sure that at that time the whole of the right field was normal. In October, 1905, examination at an ophthalmic hospital convinced him that he was also blind in the right half field of his right eye. Of this, apparently, he had been entirely unaware. By Christmas, 1905, he was blind in the whole of the left field, though still able to perceive gross differences in illumination. No sickness or giddiness at any time, and remarkably little headache.

During the last six or seven years patient has kept in quite good general health. He complains now of nothing in particular, and is able and accustomed to work. He is sure that during the past two years there has been no further growth in his tissues. Sexually he presents no abnormality of defect or excess. There is no glycosuria, but an opportunity of testing his sugar tolerance has not been afforded.

The patient, objectively, is a classical case of acromegaly. Attention is directed to the huge Punchinello chest, the resulting simian-like length of the arms, the facies, the overgrowth of the inferior maxilla and the remarkable implantation of the left lower teeth, the hands, feet, &c. An X-ray photograph of the patient's sella turcica is also exhibited.

The patient is shown mainly because of the interesting facts revealed by a comparison of the visual fields taken seven years ago and those of the present time. Seven years ago the left field was completely blind, while the right field showed loss of vision, including colours, in the temporal half, close up to but excluding the central point. The nasal field was normal. It is now found that while the left visual field remains as before, there is definite improvement in the temporal field of the right eye, the lower quadrant having been regained for colours as well, while the upper quadrant remains blind as before. The patient discovered this improvement himself some months ago, and careful investigation confirms it.

Case of Pituitary Tumour; Symptoms of Failure of Posterior Lobe Function.

By T. Grainger Stewart, M.D., & Elmore Brewerton, F.R.C.S.

S. P., female, married, aged 42. Complaint: Gradually progressive loss of vision for seven years, headaches with occasional vomiting for two years; giddiness for six months. Duration: From onset of earlier symptoms, seven years.

Previous health: Measles, whooping-cough, and bronchitis as a child; no history of venereal trouble.

Family history: Father and mother alive and well, aged 68 and 66; five brothers and five sisters alive and healthy, one sister died at the age of 12 months of teething convulsions. Patient is the mother of one son, aged 17, who is healthy. One son died at the age of 9 months of teething convulsions, and there was one miscarriage fifteen years ago.

Personal history : Periods stopped at the age of 30 ; no climacteric symptoms. At this time she began to get stout and noticed that the hair of her head, eyebrows, eyelashes and axillæ was becoming scanty. The eyes had perhaps become more prominent, and the patient's skin has certainly become paler and more waxy-looking.

Present illness : The glandular symptoms commenced twelve years ago as mentioned above. For seven years there has been gradual, but progressive, loss of vision ; it began in the left eye, when she thought the light was bad.

Mr. Brewerton (January 12, 1907) : R.V., $\frac{6}{24}$; L.V., $\frac{6}{36}$; fundus natural.

February 9, 1907 : Red field, 30° ; R.V., $\frac{6}{24}$; L.V., $\frac{6}{60}$.

October 2, 1907 : R.V., $\frac{6}{12}$; L.V., $\frac{6}{60}$.

October 18, 1908 : R.V. and L.V., $\frac{6}{18}$.

May 2, 1911 : R.V. and L.V., $\frac{6}{18}$.

July 29, 1912 : Right hand movement, L.V., $\frac{6}{24}$.

September 4, 1912 : Headaches, frontal and retro-ocular, very severe at times ; feels as if the forehead was bulging out. Giddiness, short attacks ; reels about ; does not lose consciousness and has no sensation of smell or taste. These attacks are sometimes associated with vomiting ; occasionally suffers from pain like corns on the back of neck. Her memory, especially for recent events, has been failing for the last six months, and she has become more irritable and dull. Her hearing has decreased ; she suffers from buzzing noises and beating. No active local disease, but when patient was a child she had discharge for twelve months from right ear.

Pupils : Moderate, large ; right inactive to light, left reacts to light. No nystagmus, no diplopia ; internal strabismus with paresis of the left external rectus and defective conjugate movement to the left. Some weakness of the right external rectus. Vision : (Right) hand movements (?) ; (left) $\frac{6}{36}$, contraction of field (temporal colour defect relative). Right disk, primary atrophy ; left disk, some swelling, 2D.

Hearing : Deafness is due to blocking of external ear. Motor system normal. Sensory system normal. Reflexes : (Deep) upper extremities normal ; knee-jerk brisk, right and left ; ankle-jerks defective, right and left ; (superficial) epigastric and abdominal, absent both sides ; plantars, indefinite flexor both.

Well-nourished woman, with some pallor of the skin and some deficiency of hair as above mentioned. Sugar tolerance increased.

Wassermann negative. Skiagram shows great enlargement of sella turcica.

Case of Pituitary Tumour (Lorain Type); Small Adult Body with Retarded Sexual Development, but no Adiposity; Failure of Function of Anterior Lobe.

By T. GRAINGER STEWART, M.D., & R. RUTSON JAMES, F.R.C.S.

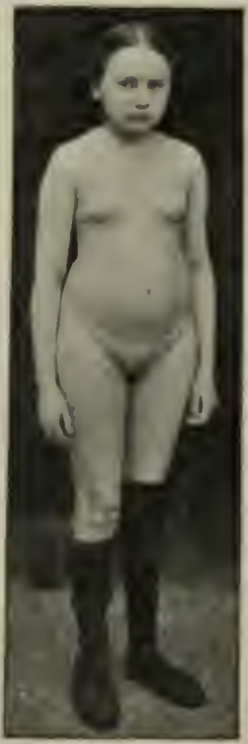
L. C., FEMALE, aged 21. Complaint: Loss of vision, vomiting, headaches and frequent seizures; duration, ten months.

Family history: Father, aged 53, alive and well; mother, aged 62, alive and well; three brothers, aged 28, 26 and 22, and one sister, aged 24, alive and well. One child died, aged 3 weeks; if living would be now aged 23; and one miscarriage after birth of patient.

Previous health: Patient was always bright and intelligent. She worked as a dressmaker from the age of 16 to 18. Her mother had not noticed anything peculiar with the child, although she seemed to be growing into a small woman; she never menstruated, but at the age of 18 began to suffer from periodical bilious attacks, which were supposed to be the commencement of menstruation.

Present illness: In December, 1911, began to get out of sorts. Before Christmas, 1911, she had a "fit," rolled her eyes about, and was dazed, but recovered in a minute or two. Three days after this "fit" she noticed her eyes becoming blind; since then she has suffered much from headache behind the eyes, vomiting and increasingly frequent seizures—two or three a day. Her memory has become impaired, and patient feels very drowsy and irritable. She has been troubled with precipitated micturition. Her sight was practically gone in August. During the three months previous to her admission patient has become very asthenic—the legs first of all becoming weak, and later the arms.

State on admission: Patient is a girl, aged 21, with the general physique and development of a girl at puberty. Her skin is normal, the hair is absent from the axilla, and scanty in the pubic region: sexual organs infantile. Mental condition: Drowsy and difficult to rouse. In her good intervals her memory is good, and she is intelligent, but she easily becomes fatigued. Special senses: Vision—unable to distinguish light from darkness; post-neuritic atrophy in both eyes. Hearing—deaf in the left ear from interruption of left auditory track. Smell—present slightly on the right side. Cranial nerves (third, fourth and sixth): Pupils large, equal, very faint reaction to light, which is not sustained; reaction to accommodation feeble; ocular movements fair, but occasionally some lateral nystagmus; other cranial nerves normal. Attitude: Patient tends to keep her head turned to the left. Motor system: Musculature poor, but no atrophy; power is moderate; no myasthenic weakness; there is some tremor in the left forearm and hand when extended, and a certain amount of tremor in both upper extremities on voluntary movement, otherwise the motor system is normal. Sensory system: Normal. Reflexes: Deep; upper extremities present; knee-jerk and ankle-jerk increased; epigastric and abdominal, normal; plantars, normal. Sphincters: Incontinence of urine.



L. C., aged 21. Case of pituitary tumour. Retarded sexual development.

October 16, 1912: Patient had a fit in which there was opisthotonos, head retraction, flexion and adduction of upper extremities. Both plantar responses extensor after the attack, which lasted for five minutes. Blood-pressure: 118 mm. Hg.; 1 c.c. of 20 per cent. pituitary extract injected; no effect on blood-pressure. Thermic reaction: 2 c.c. of 5 per cent. anterior lobe extract induced well-marked thermic reaction. Sugar test: Patient vomited when given more than 150 grm.; no sugar in urine.

Case of Acromegaly.

By W. H. Willcox, M.D.

Patient, M. B., female, single, domestic servant, aged 27. Patient first noticed her present condition in 1906, when a doctor called attention to the size of her hands. At the age of 15 patient suffered from anæmia. Up to 1906 patient had enjoyed good health and was able to take long walks. She had influenza in 1906, at which time her doctor noticed the enlargement of the hands. No history of rheumatism or specific fevers. Menses commenced at the age of 15 and continued up to 17, when patient had anæmia again and her periods ceased for eighteen months. After a further ten months of regular periods, the menses ceased, and patient has suffered from amenorrhœa ever since. In 1906 patient found difficulty in getting boots to fit her. She had to have them made specially, since no ready-made boots were broad enough for her. In 1906 patient found it impossible to wear ready-made gloves, as they were not broad enough. She had to have hand-knitted gloves. Before 1906 patient wore ordinary sizes in boots and gloves.

Since 1906 patient had suffered from progressive weakness and tiredness on exertion. She frequently used to have fainting attacks, but for the last two or three years she has not actually fainted, but has felt faint. Patient has suffered from attacks of epistaxis since childhood. Has had numbness and tinglings in the hands and feet since 1906. Eyesight good. She frequently suffers from headaches in the frontal region.

On examination there is marked enlargement of the face and cranial bones. The supra-orbital ridges, the superior maxillæ and zygomatic processes of the temporal and malar bones are enlarged. Also the bony ridges of the occipital bone and those around the mastoid processes are much enlarged. There is marked enlargement of the inferior maxillary bones. The face has an oval appearance and is much enlarged. There is general enlargement of the long bones. The hands are much enlarged, the fingers being very broad and the breadth of hands much increased. There is marked enlargement of the feet, especially in breadth. The soft tissues of the hands and feet are much enlarged. There is some scoliosis in the lower cervical and upper dorsal region. The bony prominences of the pelvis and bones generally are enlarged. The pulse is rapid, usually about 100. Heart and lungs normal. The voice is hoarse. No enlargement of abdominal viscera has been found. The temperature is slightly raised, being about 99 in the evening. There is marked sweating of the upper and lower extremities. The tongue and lips are enlarged. The eyes have been examined by Mr. Leslie Paton, who found the disks normal, and only very slight diminution of the visual fields. X-ray examination of the skull by Dr. Harrison Orton shows marked enlargement in the region of the sella turcica. Wassermann reaction is negative. The nervous system has been examined. There are no objective abnormal symptoms, except that the knee-jerks are somewhat sluggish, and the plantar reflexes show an extensor response. There is no definite enlargement of thyroid gland. All the teeth had been removed.

Patient has had treatment with thyroid extract without any benefit. She is now undergoing treatment with injections of a special pituitary extract given daily in amount equal to $\frac{1}{2}$ grm. of the fresh gland. Some improvement in the symptoms has resulted.

Urine shows a slight trace of albumin, and excess of creatinin. Cane-sugar has been given daily to determine the sugar tolerance. The results are as follows: 2 oz. of cane-sugar daily caused no sugar to appear in urine; 3 oz. of cane-sugar daily caused a trace of sugar in urine; 4 oz. of cane-sugar daily caused 4·5 grm. of sugar in urine; 5 oz. of cane-sugar daily caused 4·8 grm. of sugar in urine; 6 oz. of cane-sugar daily caused 7·2 grm. of sugar in urine.

Acromegaly: Pituitary Tumour showing the Failure of the Fields for Colour before the Failure of the White Field.

By R. W. DOYNE, F.R.C.S.

THE failure of the colour field before the white may be of special importance in cases in making an early diagnosis. C. M. W., aged 22, first began to show signs of acromegaly between the age of 16 and 17. Now has a remarkable acromegalic appearance, very long chin rounded, large hands with sausage-shaped fingers, large and gradually increasing size of the head. When first seen on December 15, 1911, the vision of the right eye was $\frac{6}{24}$, the left $\frac{6}{6}$. The right eye has never been so good as the left. On examination of the fields both showed comparatively full fields for white (fig. 1), but hemianopic fields were present for red. Patient was put on extract of pituitary gland and improved temporarily. When seen on January 30, 1912, vision was $\frac{6}{24}$ and $\frac{6}{6}$.

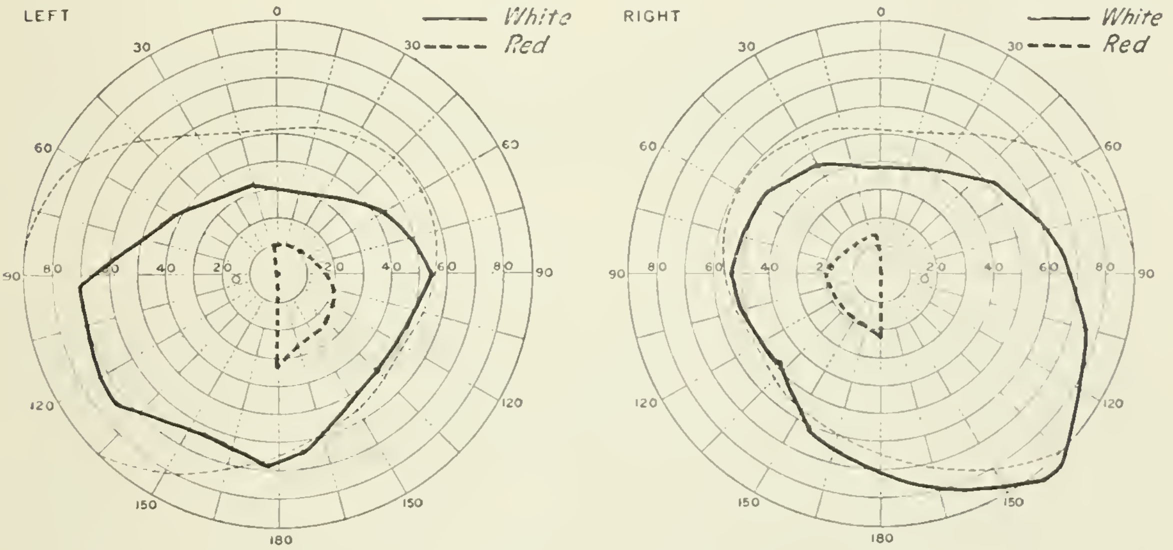


Fig. 1.

C. M. W., December 18, 1911.

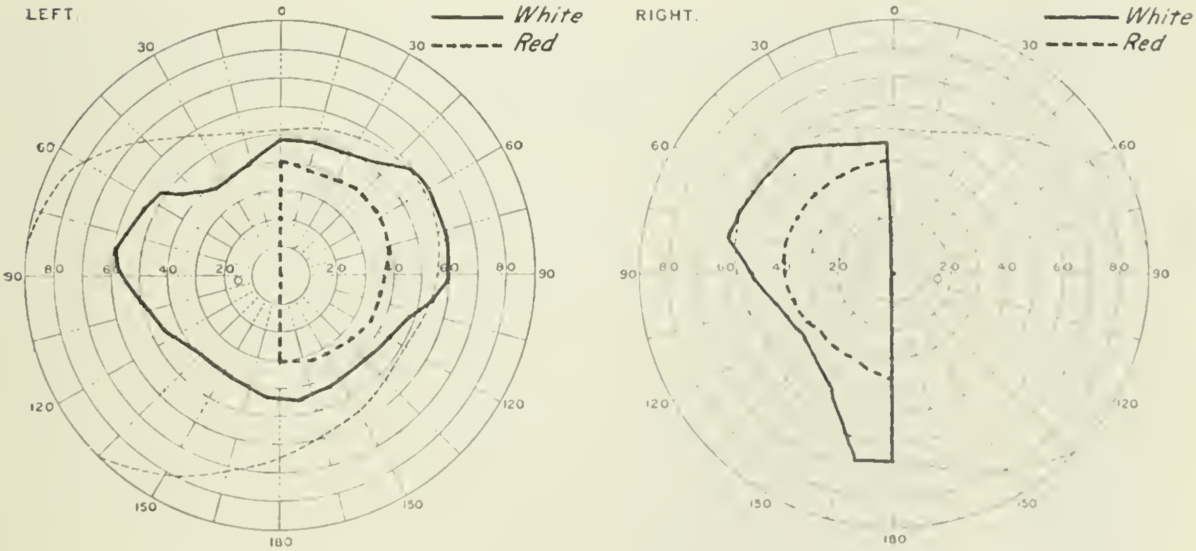


Fig. 2.

C. M. W., February 17, 1913.

About this time the right disk showed some pallor, the left disk showed doubtfully also a similar change. From that time patient began to get worse. On July 26, 1912, the outer half of the right field began to fail for white, and when examined on February 17, 1913, the major portion of the outer side of the right eye had completely failed for white and colours. In the left eye the white field on the outer side was present but no field for colour (fig. 2). On February 17, 1913, vision was in the right eye $\frac{6}{24}$, in the left $\frac{6}{12}$.

A Case of Cerebellar Ataxia with Symptoms of a (? preceding) Hypophyseal Lesion.

By JAMES COLLIER, M.D.

D. P., A BOY, aged 13. Family history *nil ad rem*. Past history: Youngest of seven children. Patient is a twin, his twin brother dying at birth. Healthy infancy; acute illness with dropsy (? rheumatic fever), aged 6. Age 7: One eye found to be defective. Double pneumonia. Age 11: Staggering gait; momentary vertiginous attacks; headaches and vomiting, which ceased four months ago; progressive failure of vision; prominent eyes; always backward. No abnormalities of growth or of features noticed.

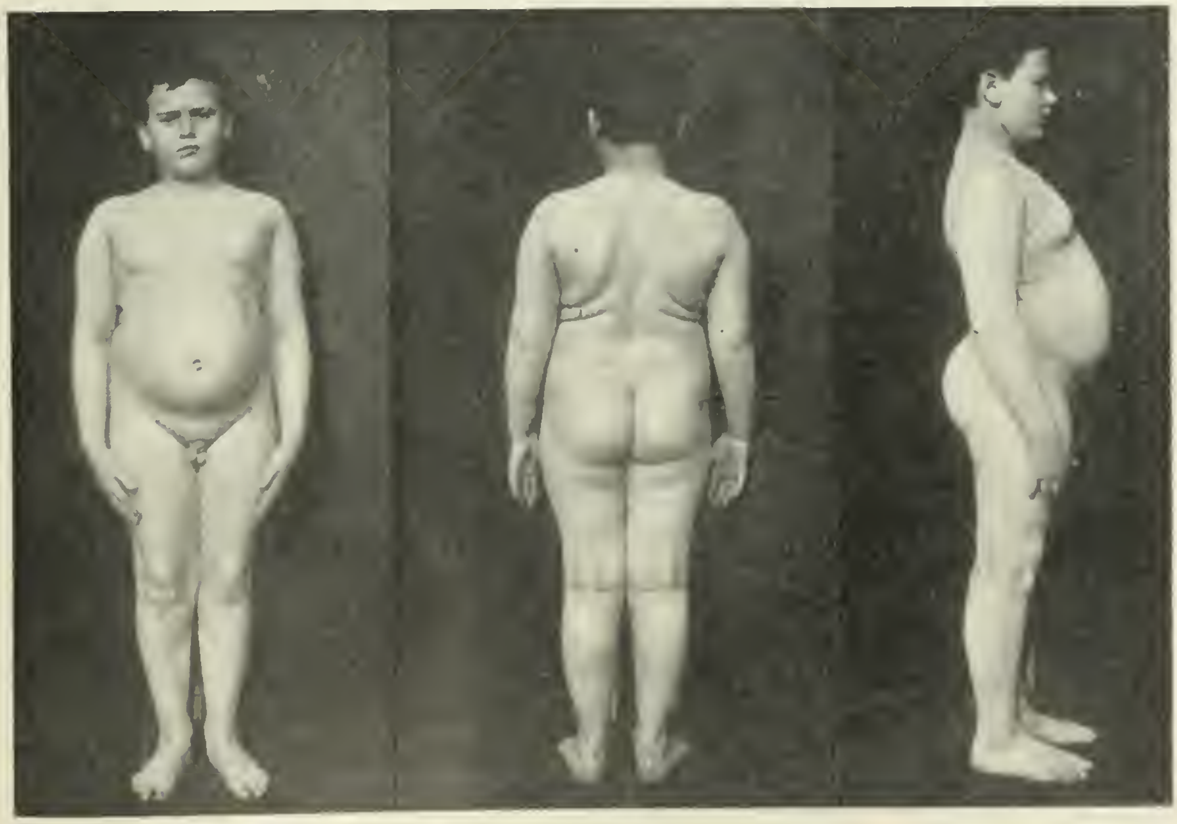
Present state (skeletal, &c.): Height, 4 ft. 5 in. (132·5 cm.); finger-tip measurement across chest, 4 ft. 10¾ in. (145·7 cm.). Large head (? hydrocephalic), no supraorbital prominence. Big face, heavy lips, and rather wide lower jaw; no underhang. No spacing of teeth. Tongue and ears negative; prominent eyes. No clinical signs of congenital syphilis. Flabby, rather cyanotic hands and feet; large, heavy, flat, square-topped fingers, out of proportion to hands and general build; toes similar. Horizontal ridging of nails on left hand. Skiagram: Enlarged sella turcica, outlines still visible; hand, epiphyses widely separated, no exostoses. Thoracic and abdominal viscera, negative. Ductless glands, *nil* remarkable. No precocity; no excess of fat; testes about normal; blood-pressure, 110 mm. Hg. Mental: Intelligent, backward.

Special senses: Vision (acuity), R., $\frac{6}{60}$; L., $\frac{6}{36}$ (one letter); fields, marked constriction, left more than right, suggestive of previous left hemianopia; disks, retinal pigment deficiency, post-neuritic atrophy. Hearing and smell normal. Cranial nerves: Sluggish pupils; irregular lateral nystagmus; no external ophthalmoplegia. Motor: Slight weakness of upper limbs, marked weakness of lower limbs—and left just weaker than right in upper and lower; hypotonia—left more than right; marked asynergia and general cerebellar ataxia; trunk also affected. Sensory: No objective loss; vertigo on throwing head back. Gait: Well-marked cerebellar ataxia—tends to fall backwards. Reflexes: All jerks brisk, right more so than left; extensor plantar response on right, flexor plantar response on left. Lumbar puncture: Fluid spurted out, cytology normal; severe frontal headache for five days; rise of temperature to 102° F.; normal on fourth day; 250 grm. of glucose produced no glycosuria. Anterior lobe injection contra-indicated. Wassermann reaction positive in blood, negative in cerebrospinal fluid.

Case of Hypopituitarism—Dystrophia Adiposo-genitalis.

By F. E. Batten, M.D.

J. B., a BOY, aged 16, the fourth of seven children, is said to have been in no way abnormal up to the age of 13, except that he was dull



Case of hypopituitarism.

at school. A year ago he began to get fat. In September, 1911, when first seen, he was 4 ft. 6 in. high and weighed 7 st. 9 lb. The subcutaneous fat is very abundant and presents female characteristics in its distribution. The penis and testicles are small and infantile in appearance. There is no development of hair or other secondary sexual characteristics. Mentally the boy is intelligent, but somewhat lethargic. In other respects physical examination is negative. There is no hemianopia and no optic atrophy. There is some confusion in the recognition of colours, but no definite loss of colour fields. Skiagrams show no abnormality of the sella turcica. There is no glycosuria. The patient shows marked tolerance for sugar, as much as 300 grm. of glucose having been given to him without causing any glycosuria or change in the urine.

The case is presented as an instance of Fröhlich's syndrome of dystrophia adiposo-genitalis occurring apart from the presence of pituitary tumour. There is no evidence at present of the existence of a pituitary tumour in the patient and the case is considered to fall into that division of cases of hypopituitarism, described lately by Cushing, in which the glandular deficiency is primary. The boy has been treated with the dried pituitary, the whole gland and the anterior and posterior lobe separately, also with thyroid gland, but without any alteration in his condition.

Case of Hyper-activity of Anterior Lobe combined with Deficient Action of Posterior Lobe.

By E. Cecil Williams, M.B.

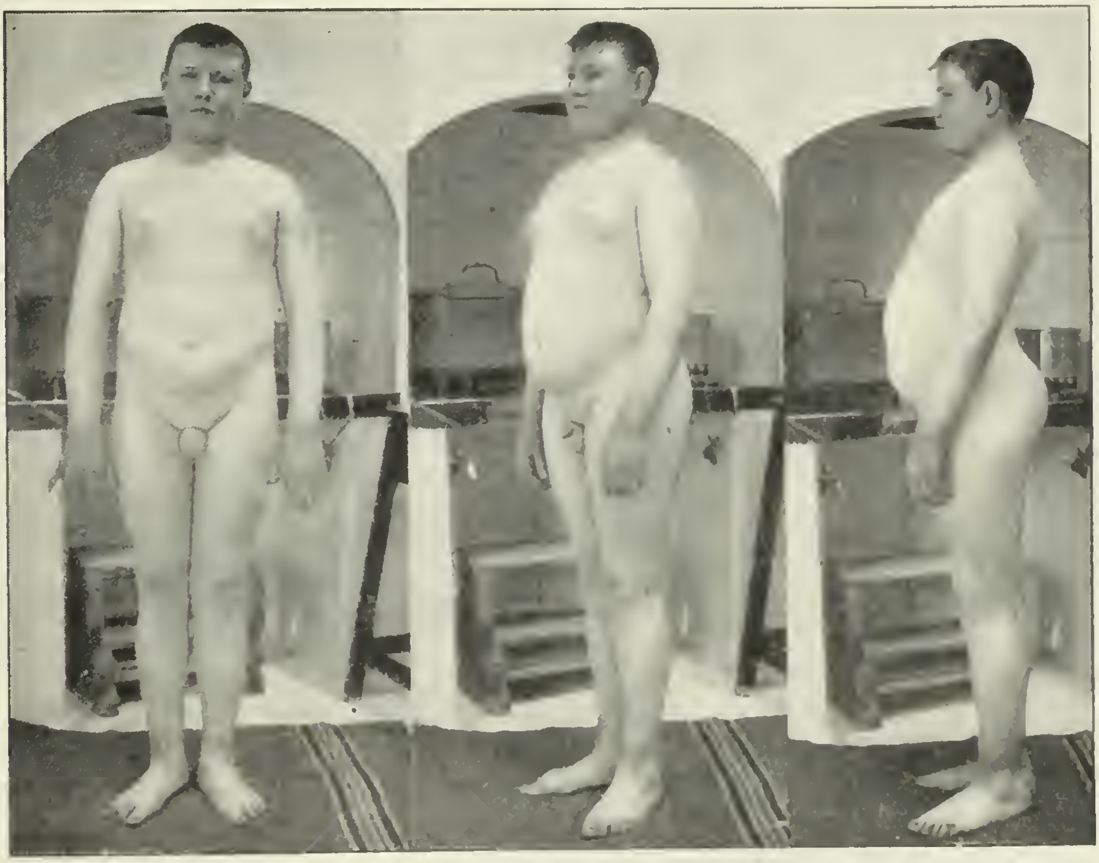
A. C., male, aged 13 years 8 months.

Family history: Paternal grandfather said to have been a very big man.

Previous health good.

Present illness: Excessive growth began at 9 years of age with increase in height and stature, and in addition adiposity of the typus femininus. Viewed in profile lumbar lordosis is marked.

Present state: Is intelligent and active; height, 5 ft. 2 in.; weight, 10 st. 7 lb.; circumference of head, 22¼ in.; chest measurement, 35½ in.; umbilical measurement, 35 in. X-rays show large size of the hands, and tufting of the terminal phalanges. Skiagram of the skull is not clear enough to enable one to say anything definite as to the size of the sella turcica. The extremities tend to be cold and blue. Blood-pressure, 115 mm. Hg. Genitals not well developed for age, no pubic hair. There are no local signs, no headache; vision and fundi are normal. Glandular symptoms: Increase in stature (anterior lobe activity), and adiposity (posterior lobe defect). Sugar tolerance not estimated. Boy has no liking for sweet things.



Note.—He has increased 1 in. in height during the last two months, and there is a very slight loss of weight.

DISCUSSION ON DISEASE OF THE PITUITARY BODY.

The Structure and Functions of the Pituitary Body.

By E. A. Schäfer, F.R.S.

The pituitary body is present in all vertebrates which have been examined. It must be presumed, therefore, to be an organ of considerable morphological interest, but the fact that it is also of great physiological importance has only been known within recent years. Its development occurs as an extension of Rathke's pouch, which is an invagination of the buccal ectoderm towards the brain. This is met by a hollow downgrowth from the thalamencephalon, and the combination of the two into one organ forms the pituitary body. The original connexion with the mouth may be indicated even in the adult by certain epithelial structures which have been discovered in the palate and the base of the skull (Erdheim, Haberfeld). The connexion with the thalamencephalon is evidenced by the extension from the third ventricle (infundibulum) which projects into the stalk of the pituitary, and in some animals is continued into its interior in the form either of a straight or a more or less convoluted canal.

Structure.

The gland (fig. 1) consists of three parts—viz., *pars anterior seu glandularis*, *pars intermedia*, and *pars nervosa*. There is usually a cleft in the middle of the organ filled with glairy fluid. This cleft, which is the remains of the original epithelial cavity of the buccal extension, allows the gland to be readily separated into two parts, which have been termed the *anterior* and *posterior lobes*.

Pars anterior seu glandularis.—This is epithelial in structure, being composed of both granular and clear epithelium cells (fig. 2), which are perhaps merely phases of the same kind of cell. The granules are eosinophile in most of the cells, and resemble in appearance those of secreting glands, but there are also cells containing basophile granules. This anterior part of the gland is extraordinarily vascular (fig. 3), with large capillaries of a sinusoidal character, which come into close contact with the cells. The *pars anterior* receives no fewer than eighteen to twenty small arteries which converge into it from the circle of Willis; the veins pass away along the stalk (Dendy and Goetsch). In some animals, as in the skate, many of the cells of the *pars anterior* are columnar, and are set around the blood sinuses like an epithelium around gland alveoli (Gentes, Herring). In the tortoise columnar cells surround closed acini or tubules, which contain a colloid substance. Such vesicles are common in myxœdema (fig. 4), and they have also been described after thyroidectomy. Similar vesicles occur normally in the *pars*

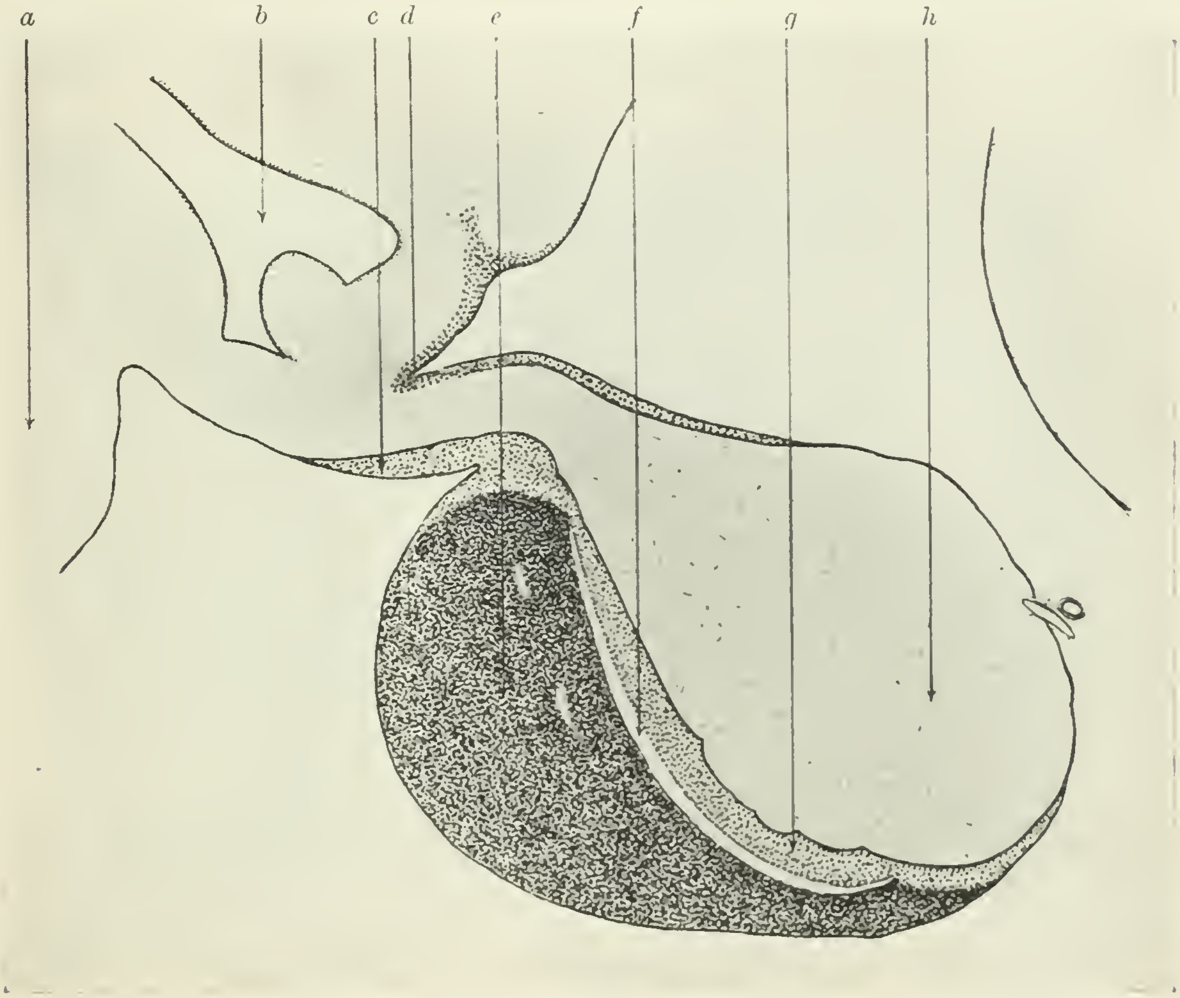


Fig. 1.

Median sagittal section through pituitary of monkey; semi-diagrammatic (Herring). *a*, optic chiasma; *b*, third ventricle; *c*, *g*, pars intermedia; *d*, epithelium of pars intermedia extending round neck of pars nervosa; *e*, pars glandularis seu epithelialis; *f*, intraglandular cleft, lying between pars glandularis (*e*) and pars intermedia (*g*); *h*, pars nervosa.

intermedia, and are also increased in number and size after thyroidectomy. According to Edinger, there exist lymphatic spaces in the *pars anterior* closely surrounding the cell columns; he regards them as furnishing a means by which the secretion of the cells passes into the general system. It is, however, more probable that the products of secretion are taken up directly into the blood-vessels.

Pars intermedia.—This is also epithelial in character (fig. 5), but the cells are less coarsely granular than those of the *pars anterior*, and stain less deeply. Some are to be seen in process of transformation into the "hyaline bodies" of Herring, which pass into the adjoining part of the *pars nervosa*. There is, in the *pars intermedia*, a greater tendency to arrangement into vesicles than in the *pars anterior*, and the vesicles are distinctly reminiscent of thyroid structure, but they do not enclose a colloid identical with that of the thyroid, although the same name has been given to the material found within them. One noteworthy difference is that the pituitary never contains iodine, which is so characteristic of the secretion of the thyroid (Sutherland Simpson,

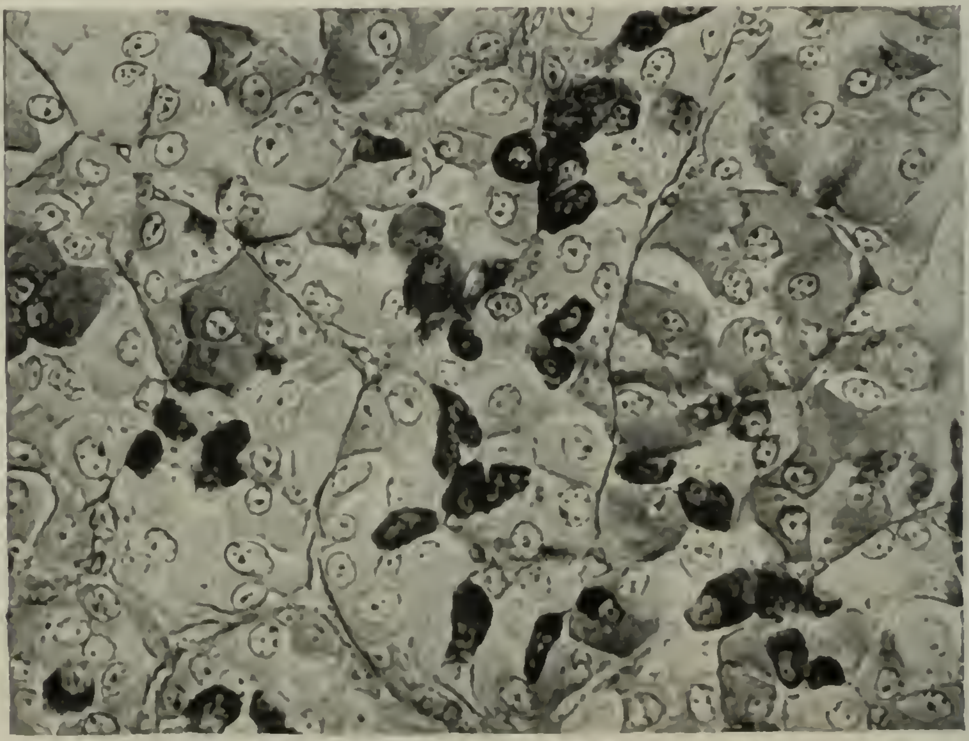


FIG. 2.

Cells of pars glandularis of cat. Photograph magnified 500 diameters (Herring). The section was fixed with Flemming's solution and stained with eosin and picrofuchsin.

Andrew Hunter). Colloid may also be detected, according to Professor and Mrs. A. S. Grünbaum, in the blood-vessels of both the *pars anterior* and *pars intermedia* of the human pituitary, although they failed to find it in the *pars nervosa.* It certainly, however, occurs in the interstices of the latter, as Halliburton and his fellow-workers have shown (fig. 6). The *pars intermedia* has far fewer vessels than the *pars anterior* (fig. 3), and is provided with true capillaries, which are less closely related to the cells than is the case with the sinusoids of the *pars anterior.*

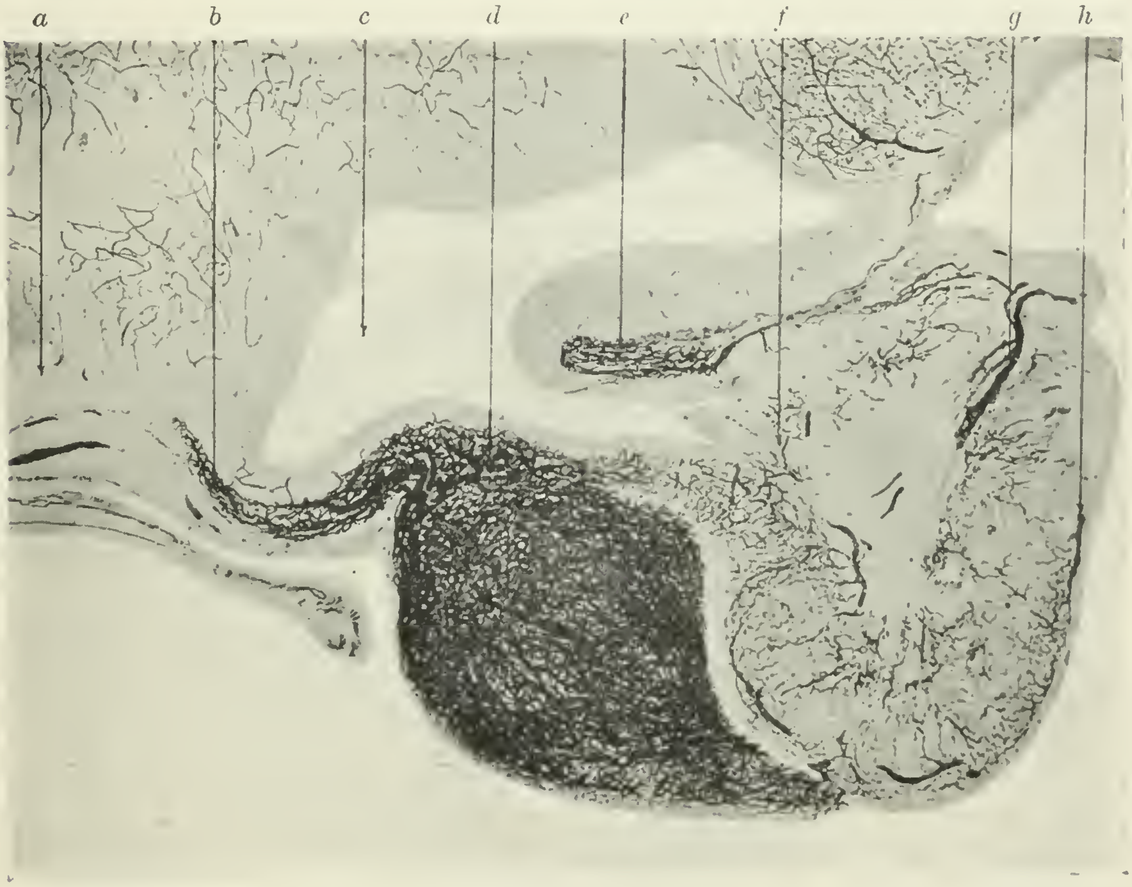


FIG. 3.

Median sagittal section of pituitary body of cat with blood-vessels injected. Photograph (Herring). *a*, optic chiasma; *b*, tongue-like process of gland extending forward towards chiasma; *c*, third ventricle; *d*, pars glandularis; *e*, extension of pars intermedia around pars nervosa (*f*); *g*, artery entering pars nervosa; *h*, vein of pars nervosa.

Pars nervosa.—This abuts upon the *pars intermedia* near the transverse cleft in the gland. Elsewhere it is in most animals almost surrounded by an extension of the *pars anterior* and *pars intermedia.* The *pars nervosa* is composed of neuroglial tissue without true nerve cells and with few vessels. In many animals, but not in man, it contains, as already stated, an extension of the infundibular cavity. In birds and reptiles this is convoluted or branched, simulating the appearance of a duct or ducts. Numerous granules and masses of hyaline substance, which are obviously derived from the cells of the *pars intermedia*, from which they can be traced, are seen in the interstices of the *pars nervosa* (fig. 7), and can be followed in it into the infundibulum (or into its extension in animals), and thus into the cerebrospinal fluid. The granules are especially conspicuous and numerous in birds. The *pars nervosa* also usually contains a large number of pigment granules.

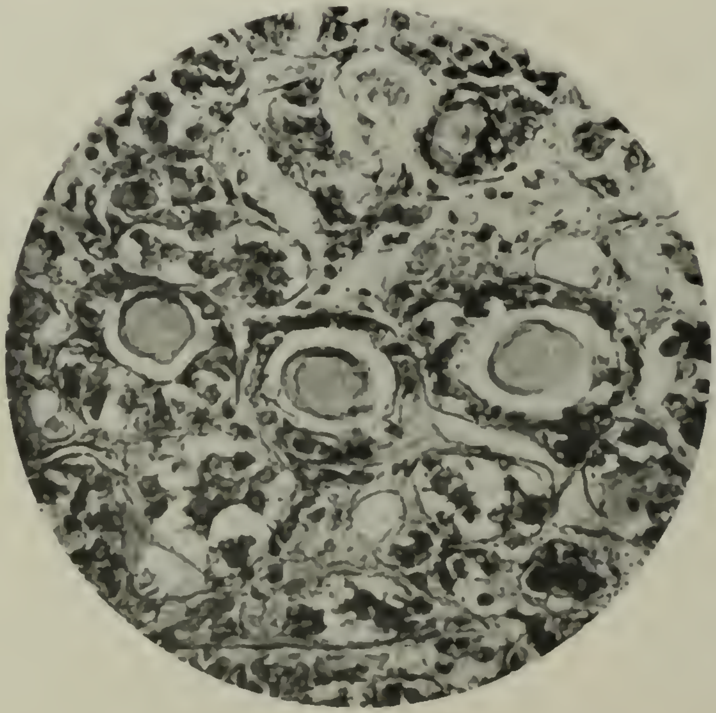


Fig. 1.

Section of pars glandularis of human pituitary from a case of myxœdema described by Dr. Hale White. Photograph magnified 300 diameters.

Changes under Abnormal Conditions produced Experimentally or by Disease.

As has already been noted, remarkable alterations occur in the pituitary as the result of thyroidectomy, and similar changes appear to result in cases of atrophy of the thyroid. The following have been described after thyroidectomy:—

(1) Enlargement of the whole pituitary.

(2) Presence of colloid substance in vesicles in the *pars anterior* and a great increase in that of the *pars intermedia*. This colloid substance

differs, however, as already stated, from that of the thyroid in never containing iodine.

(3) A great increase in the number of hyaline bodies in the *pars intermedia* and *pars nervosa* right up to the extension of the cavity of the third ventricle into the gland (fig. 8).

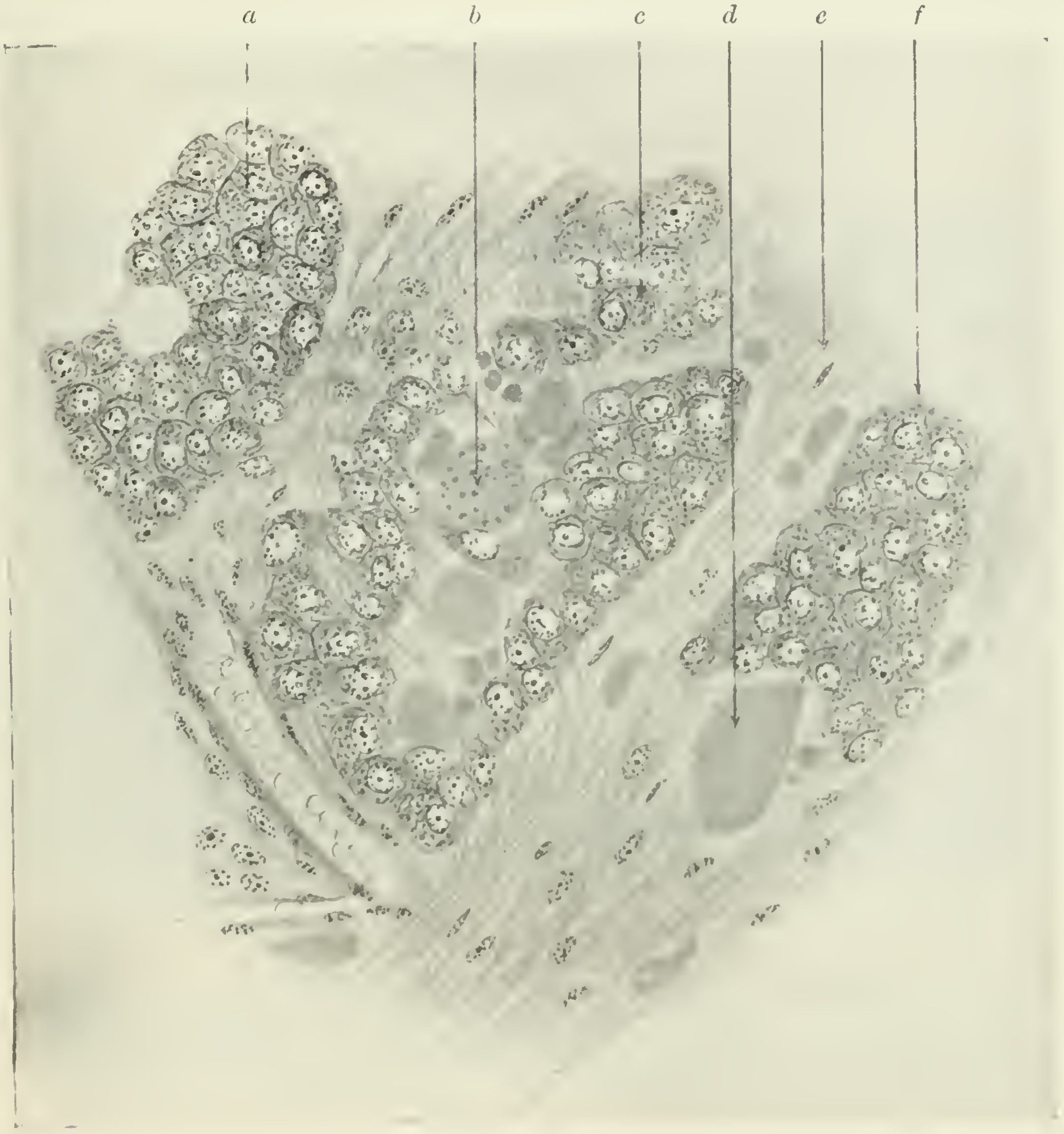


FIG. 5.

Groups of cells of pars intermedia abutting on pars nervosa. From pituitary of cat (Herring). *a*, *c*, *f*, cells of pars intermedia; *b*, a cell undergoing granular degeneration; *d*, hyaline body lying between the neuroglial fibres of pars nervosa (*e*). Other hyaline bodies are seen between the cell groups of the pars intermedia.

It is not easy to explain these changes on physiological grounds, because the functions of the two glands are by no means identical, nor are they in most respects similar. It would, however, appear that both are connected in some way with growth and general nutrition, and especially with sexual development, for it is observed that in cases of removal or destructive changes in either gland, there is produced in young animals a stunting of growth and a condition of sexual infantilism, with a tendency to mental dullness and adiposity at all ages.

A connexion between the sexual glands and the pituitary is further to be found in the fact that castration has been found by most observers to be followed by hypophysial hypertrophy. Erdheim and Stumm also describe enlargement of the pituitary in pregnancy. The change chiefly affects the *pars anterior*, in which these authors have noted the appearance of peculiar, large, finely granular cells which they have termed "pregnancy cells." But the greatest enlargement of the pituitary is found in giants and acromegalics. The skeleton of giants has long been known to be characterized by a disproportionately large sella turcica, and there seems little doubt that the enlarged pituitary is associated

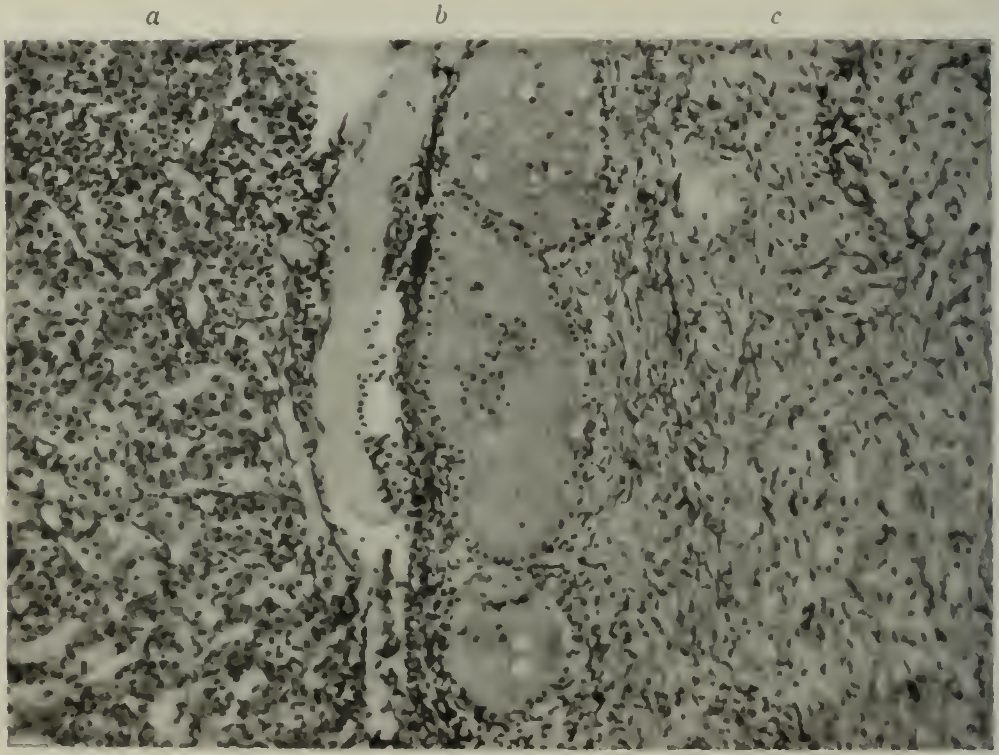


FIG. 6.

Colloid substance within cyst-like spaces of the pars intermedia of the human pituitary. Photograph magnified 120 diameters (Halliburton, Candler and Sikes). *a*, pars glandularis; *b*, pars intermedia; *c*, pars nervosa. The intraglandular cleft is seen between *a* and *b*. The cysts extend into the pars nervosa.

with the abnormal growth met with in giantism. The hypertrophy is believed to be confined to the *pars anterior*. There is also a marked enlargement of the anterior lobe in acromegalics. This enlargement usually constitutes a definite tumour, which, primarily at any rate, seems to be caused by a hyperplasia of the glandular substance—(adenoma, Benda)—although this may ultimately undergo degenerative destruction, or may even become malignant in character. If other than glandular tumours occur primarily in the pituitary, they do not appear to be associated with acromegaly. The most probable explanation of the unusual development of the skeleton in both giants and acromegalics is that the *pars anterior* normally produces and gives off to the blood a hormone which stimulates the nutrition and growth of the bones, and that when the gland becomes hypertrophied this hormone is produced in unusual amount. It is usually believed that the difference between the giant and the acromegalic is that in the former the hypertrophy of the gland has commenced before the epiphyseal cartilages are ossified, and whilst the long bones are still capable of growth in length, while in the acromegalic the hypertrophy has not commenced until after the ankylosis of these cartilages (Tamburini, Woods-Hutchinson).

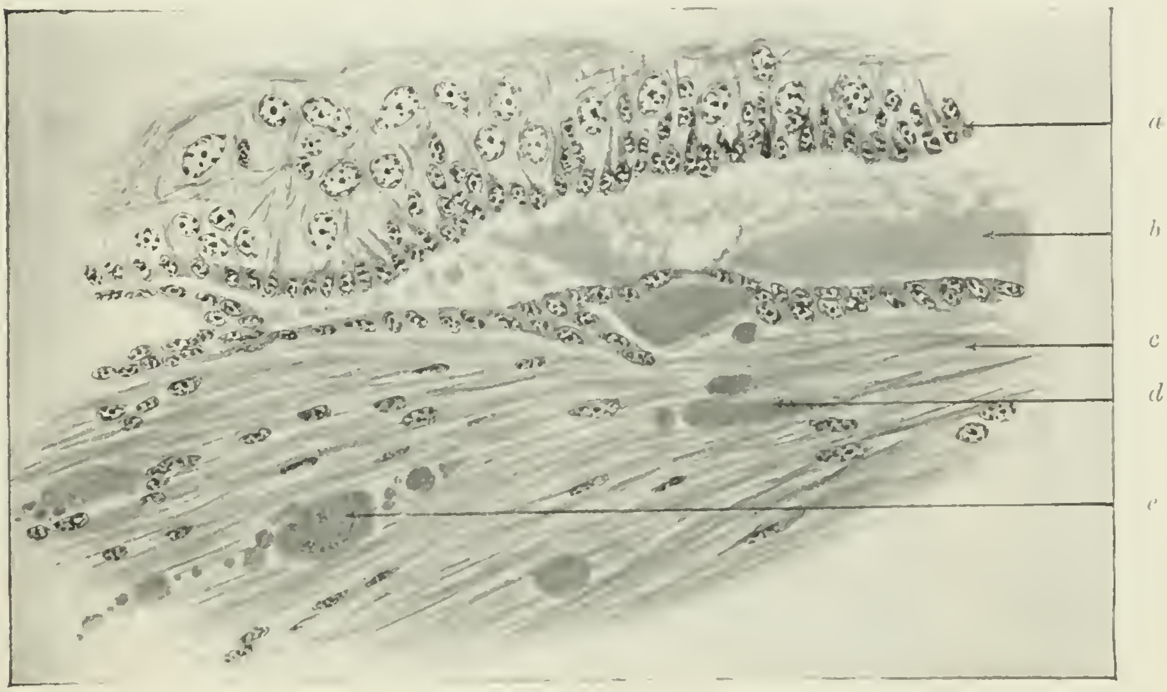


FIG. 7.

Section of part of posterior lobe of pituitary of cat (Herring). *a*, ependyma cells lining the central cavity (extension of infundibular process of third ventricle); *b*, central cavity with hyaline substance; *d*, hyaline bodies between neuroglial fibres of pars nervosa; *e*, a granular body in pars nervosa.

PHYSIOLOGY OF THE PITUITARY.

This has been investigated experimentally by methods of removal and by methods of addition—i.e., by administration of extracts of the gland or by its implantation. Regarding the effects of removal, the evidence is conflicting. Two modes of operation have been generally employed in animals (dogs)—viz., (1) that of Horsley, who gets at the gland through the roof of the mouth and the base of the skull; and (2) that of Paulesco, who attacks it from the side by aid of free openings through both temporal regions of the skull and elevation of the hemispheres. By the latter method it is more easy to see what is happening, while by the former there should be less interference with the brain itself. Nevertheless, it is stated by Paulesco that if the same amount of interference with the brain be intentionally produced without removal of the pituitary no obvious result follows from such interference. Some experimenters, amongst whom may be especially mentioned Paulesco and Harvey Cushing, state that removal of the gland is nearly always, if not invariably, followed by death; which often occurs within two or three days, although the animal, especially if young, may live as long as two or three weeks. Paulesco states that mere detachment from the infundibulum, Cushing that removal of the *pars anterior* alone, is fatal. According to Cushing, the animals become lethargic, with feeble pulse and limp muscles. They sometimes exhibit symptoms of tetany; their temperature becomes reduced, and they eventually die in a comatose condition. To this complex of symptoms he has given the name "cachexia hypophyseopriva." Young animals which survive extirpation have their growth retarded, and their sexual activity remains undeveloped (Cushing, Benedict, and Homans). Other experimenters—e.g., Horsley and Handelsmann—assert that total removal is not fatal, death when it occurs being due to complications of the operation, and that the extirpation may be unaccompanied by any adverse symptoms. Still less, therefore, according to these observers, will removal of a part only or the mere detachment from the infundibulum prove fatal. On the other hand, Aschner, who also finds that complete extirpation is not fatal (buccal method), states that his animals, if young, remained small and infantile; their milk teeth were retained and also their lanugo hair; their epiphyses did not ankylose, and their temperature was 1 to 1·5° C. lower than normal. The thyroid was enlarged, and showed increase of colloid. The cortex of the suprarenal was thickened. The thymus was enlarged. Similar observations are recorded by Ascoli and Legnani.

In pregnant animals Aschner found that removal of the gland is always followed by abortion. Adrenalin injections in animals deprived of pituitary produced little or no glycosuria. In the adult the chief effect of the removal was the putting on of fat. The above symptoms correspond with those described as signs of hypopituitarism by Cushing. This condition is marked by an increased tolerance to carbohydrates (Borchardt), the limit of alimentary glycosuria being markedly raised. Cushing believes that this has an important influence in determining the formation of fat. This tendency to adiposity occurs both in young animals with pituitary lesions and also in the adult with partial removal or destruction, and is one of the most characteristic signs of the condition. But, as above mentioned, Cushing is of opinion that entire removal of the gland or even of the *pars anterior* alone is invariably fatal, although young animals may survive the operation for a few weeks.

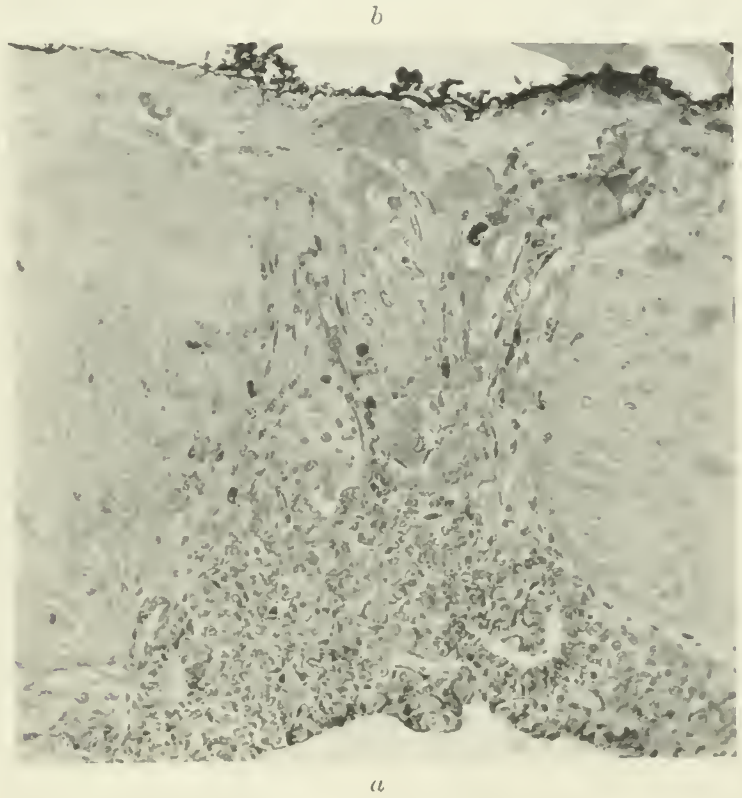


FIG. 8.

Section of pituitary of dog through the neck of the organ. Photograph magnified 160 diameters (Herring). *a*, intraglandular cleft; *b*, cavity of pars nervosa continued from infundibulum. Immediately above *a* is seen epithelium of pars intermedia, and from this cells and hyaline bodies are streaming through the pars nervosa towards the extension of the infundibulum (*b*). The specimen is from a dog whose thyroid had been removed nineteen days before the animal was killed.

It is seen, therefore, that the evidence regarding total removal is conflicting, and it is necessary that the point, which is important both physiologically and clinically, should be cleared up by further work.

Mere injury to the pituitary without removal may cause marked polyuria, which disappears after a few days. This probably explains the polyuria which sometimes accompanies fracture of the base of the skull.

Destruction by disease appears to be generally fatal within a certain period, but as there usually co-exist the various complications of an intracranial tumour which may ultimately assume a malignant character, one must be careful in drawing conclusions regarding this result. The effects of disordered functions of the pituitary (*dyspituitarism*) have been elaborately worked out by Cushing, who has endeavoured with more or

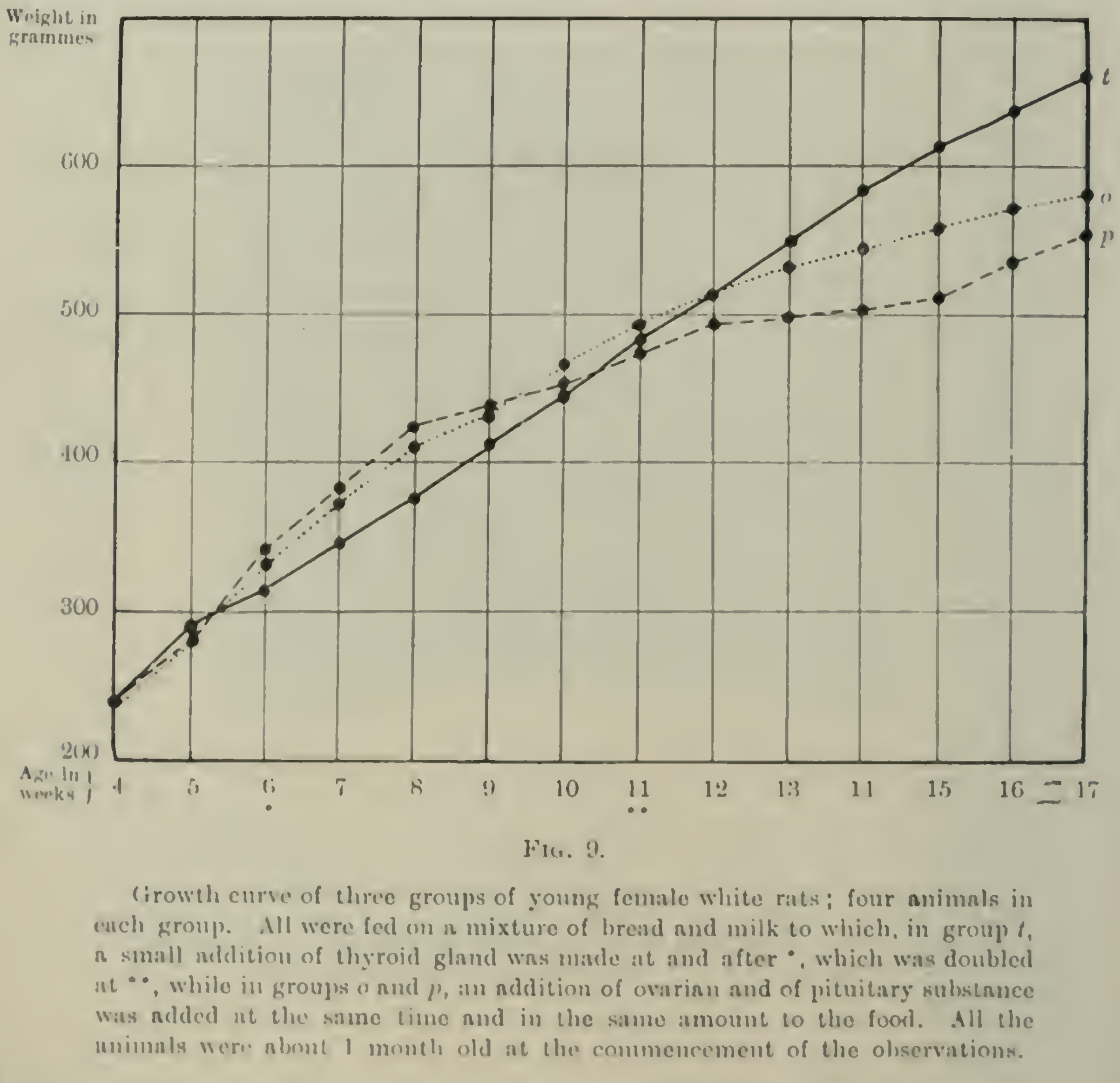


FIG. 9.

Growth curve of three groups of young female white rats; four animals in each group. All were fed on a mixture of bread and milk to which, in group *t*, a small addition of thyroid gland was made at and after *, which was doubled at **, while in groups *o* and *p*, an addition of ovarian and of pituitary substance was added at the same time and in the same amount to the food. All the animals were about 1 month old at the commencement of the observations.

less success to correlate the symptoms which result from experimental lesions in animals with those produced by disease. Cases of dyspituitarism may commence with symptoms of increased growth and function (*hyperpituitarism*), and this may subsequently give place to symptoms of diminished growth and function (*hypopituitarism*), leading ultimately to those of destruction of the gland (*apituitarism*).

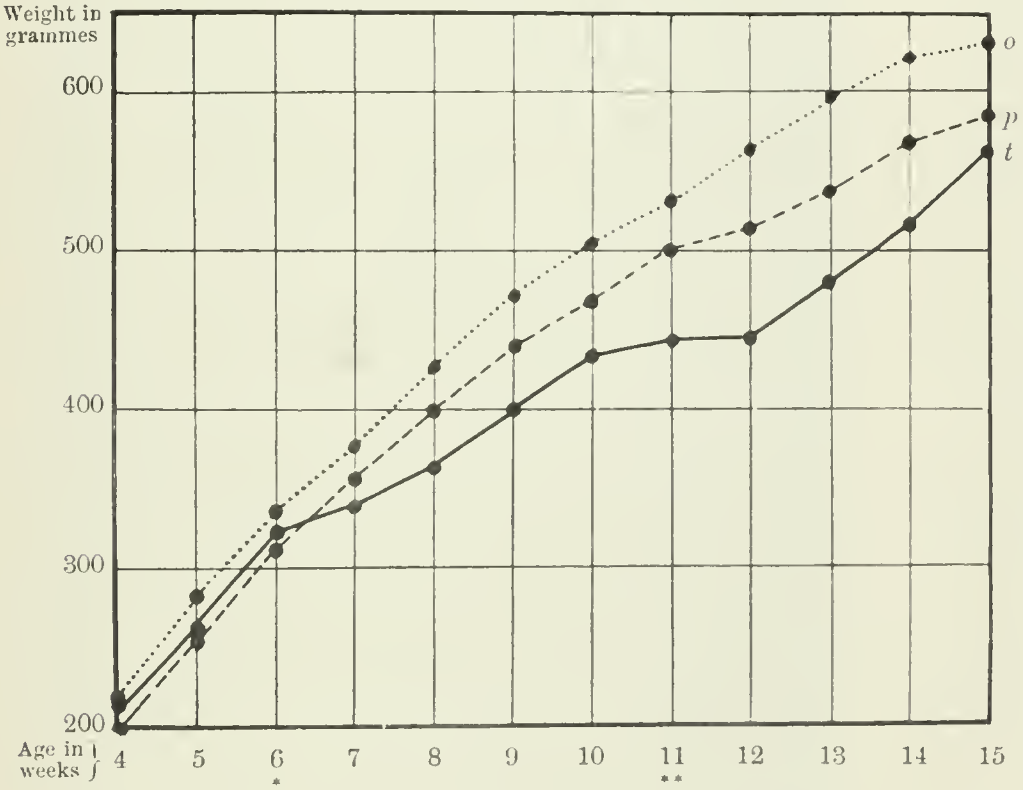


FIG. 10.

A similar growth curve of three groups of young male white rats; three animals in each group.

EXPERIMENTS ON THE ADMINISTRATION OF THE GLAND SUBSTANCE AND ITS EXTRACTS.

Feeding with the fresh or dried gland substance is normally not attended with any obvious result even in growing animals (figs. 9 and 10). There is certainly no retardation in growth such as has sometimes been described, and the acceleration which has also been noted in some cases is probably accidental. But feeding with the gland substance in animals in which the organ has been experimentally removed or injured is attended by decided amelioration of the symptoms produced by the lesion (Cushing).

Implantation of the fresh gland and *subcutaneous injections* of saline extracts seem also to have no definite effect upon growth in the normal animal, although some observers have described retardation of growth as the result of such injections. Attempts to graft the organ are usually unsuccessful. One result which is often obtained is a temporary polyuria which disappears as the graft becomes absorbed. Such experiments are more likely to be successful if the animal's own gland has been removed previously; under these circumstances Cushing has occasionally succeeded in obtaining a graft to hold.

Saline extracts of pituitary injected intravenously have a marked effect upon all involuntary muscles. They cause constriction of most of the blood-vessels of the body (Oliver and Schäfer) (in the duck, Noël Paton and Watson observed dilatation and not constriction); powerful and usually slowed action of the heart (Howell), the tone of which is increased; contraction of the bladder and uterus (Dale and Blair Bell); and of the bowel (Blair Bell); the pupil of the excised eye (frog) is dilated (W. Cramer). Glycosuria is also produced as the result of such injection. The action of the extracts is not, like that of the medulla of the suprarenal capsules, limited to parts supplied by sympathetic nerve-fibres, but seems to be a general and direct effect upon involuntary muscle, nor is the glycosuria produced by pituitary extracts caused by an action upon the pancreas as is the case with suprarenal glycosuria. The substance producing these effects is of a relatively simple chemical nature, is soluble in water and dialyzable, and is not destroyed by repeated boiling nor by long keeping in the dried state or in a sterilized solution; it is insoluble in alcohol and ether. A second dose administered shortly after the first is followed not by a second rise but by a fall in pressure, which resembles that caused by choline, although the depressor substance so obtained is not identical with choline (Schäfer and Vincent). It is not certain that this depressor substance, which is soluble in alcohol as well as in water, is specific to the pituitary.

Another action produced by intravenous injection of pituitary extract is to excite or increase secretion in certain glands—viz., the kidney (Magnus and Schäfer, Schäfer and Herring) and the mammary gland during lactation (Ott and Scott, Schäfer and Mackenzie). In the kidney (figs. 11 and 12) the increase of secretion is accompanied by dilatation of the renal arteries, so that the organ swells. The action is therefore different upon the renal vessels from that on the arteries in general, which are strongly contracted by it. The rise in blood-pressure produced by this general contraction is not the sole cause of the

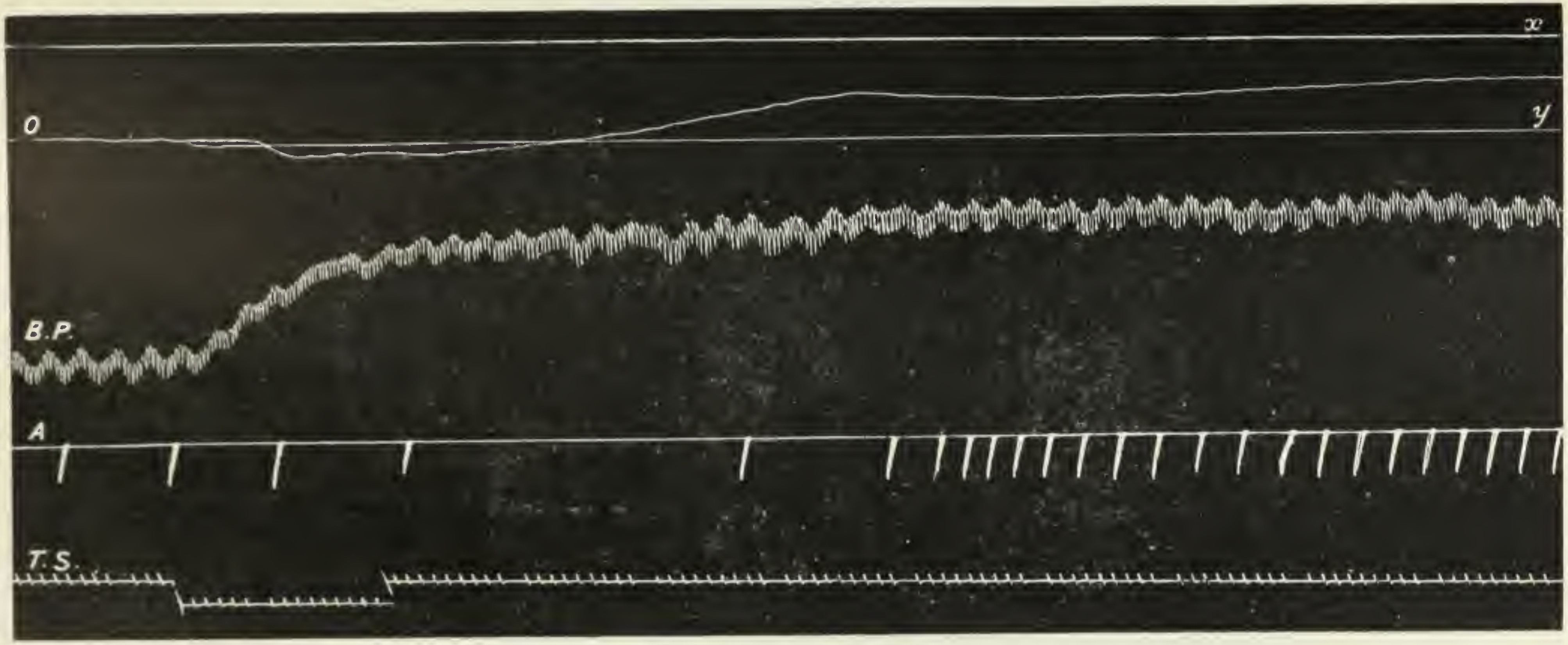


Fig. 11.

Tracing from the cat, showing the effects upon blood-pressure, kidney volume and urine flow of 5 c.c. of extract of human pituitary (posterior lobe) (Halliburton, Candler and Sikes). *O*, tracing of kidney volume (the space between the lines *x*, *y*, represents a change of volume of 1 c.c.); *B.P.*, blood-pressure in carotid; *A*, record of urine drops. This line also served as the abscissa of the blood-pressure, but has been artificially raised 80 mm. *T.S.*, time marking in seconds. The depressed part of this line shows the period of injection of the extract into the jugular vein.

increased secretion of urine; for a second dose administered a short time after the first will again accelerate secretion; although the second dose may not cause any rise of general blood-pressure, but rather a fall. There is, therefore, a specific diuretic effect upon the renal epithelium.

It is one of the peculiarities of the active material that, as already indicated, a temporary immunity to its action is readily established. This is especially the case with its effects on involuntary muscle. The immunity is less marked, although not altogether absent, so far as the effects on secretion are concerned.

Regarding the action of pituitary extract upon the mammary gland, intravenous injection is immediately followed by rapid secretion (fig. 13). The milk does not easily exude from the intact nipple; but, if the nipple be cut into and the ducts severed, milk pours from the gland. Intramuscular injection in the human (lactating) subject causes in the first instance a feeling of tingling in the breasts. This is followed by free secretion. In the goat, as the result of intravenous injection into an ear-vein, Ott and Scott obtained a vastly greater amount with five minutes' milking than had been obtained in the same period just before injection. In cows Gavin has found that the injection—whether subcutaneous or intravenous—although it may produce a determination of milk to the lower part of the udder, and an immediate increase of the milk obtained, does not increase the total amount yielded *per diem*, nor is

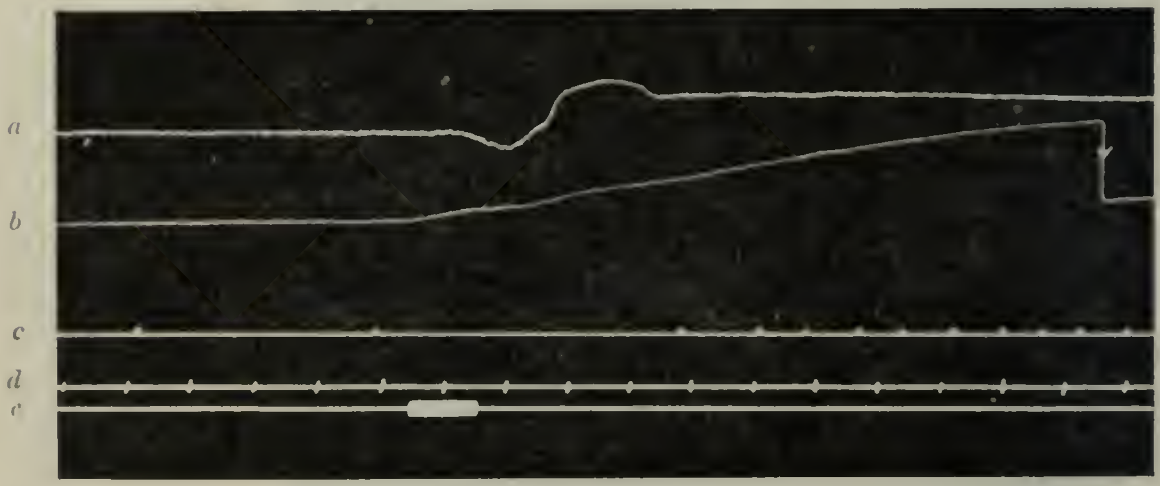


FIG. 12.

Effect of injection into the jugular vein of cat of 5 c.c. of an extract of the posterior lobe of the cod's pituitary (Herring). *a*, tracing of blood-pressure; *b*, tracing of kidney volume (artificially lowered at arrow); *c*, record of urine drops; *d*, time in ten-second periods; *e*, signal of injection.

the fatty content perceptibly increased. Mackenzie got just as great a flow with the pituitary of the bird as with that of the mammal; and Herring has shown that extract of the pituitary of fishes and other vertebrates is also markedly galactogogue in mammals.

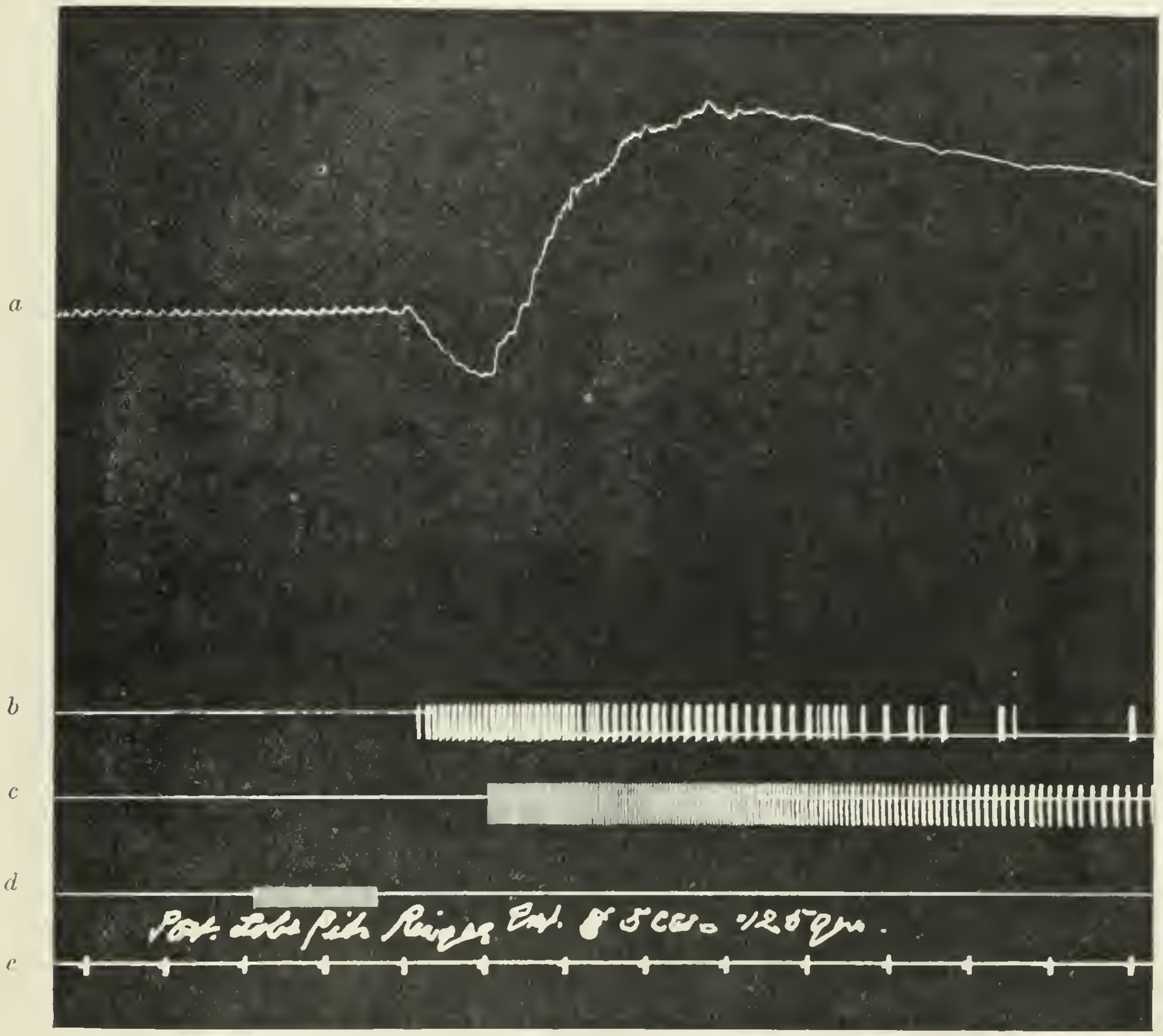


FIG. 13.

Effect on blood-pressure and milk secretion in a lactating cat of intravenous injection of 5 c.c. extract of pituitary of ox (posterior lobe) (K. Mackenzie). *a*, tracing of blood-pressure from carotid; *b*, drops of milk from a hollow needle inserted into one of the mammæ; *c*, drops of milk from an incised mamma; *d*, signal of injection; *e*, time in ten-second intervals.

The substance which produces the effects upon blood-pressure, heart and kidney is contained only in the so-called posterior lobe (*pars intermedia plus pars nervosa*); there is none in the *pars anterior* (Howell). There appears at any one time to be more in the *pars nervosa* than in the *pars intermedia* (Herring). Since the *pars nervosa* is composed almost entirely of neuroglia, and this tissue itself is not known to yield any substance having the properties of the active material of pituitary, it is more than probable that this material is contained in the granules and hyaline bodies which have already been noted as passing from the *pars intermedia* through the *pars nervosa* into the third ventricle. The cerebrospinal fluid, ought, therefore, to contain this material also. It has in fact been found by Cushing and Goetsch that if the cerebrospinal fluid be concentrated over a water-bath the resulting liquor produces the same effects upon the blood-vessels when injected intravenously as those yielded by saline extracts of the posterior lobe of the pituitary.

According to the observations of Ott and Scott and of Mackenzie, the galactogogue hormone of the pituitary is also confined to the posterior lobe, and it is commonly assumed to be identical with that which causes the other effects upon blood-vessels, heart and kidney. But an experiment of Herring seems to show that it may be a distinct hormone; for he obtained a marked galactogogue action from extract of the pituitary body of the skate (fig. 14), without any of the other effects upon blood-pressure, heart and kidney. Herring also found an active hormone in an extract obtained from the *pars anterior* of the cod. This extract produced a strong response in the mammary gland of a lactating cat. But as there was also caused a distinct rise of blood-pressure, which according to most observers is never obtained with extracts of pure anterior lobe substance, it is possible that there may have been in this case some contamination with material from the posterior lobe, which in the cod contains the active hormones in abundance.

SUMMARY AND CONCLUSIONS.

(1) The pituitary body is developed partly from the ectoderm of the buccal cavity, partly from that of the neural canal. It is therefore partly epithelial and partly nervous in origin.

(2) The portion derived from the buccal epithelium consists of two portions, termed the *pars anterior seu glandularis* and the *pars intermedia*.

(3) The *pars anterior* is composed of large closely packed epithelium cells, between which are very numerous and large blood capillaries of a sinusoidal nature. Many of the cells are filled with eosinophile granules; some have basophile granules; others are clear or

only slightly granular. It is probable, but not certain, that these are different phases of the same kind of cell.

(4) The *pars intermedia* contains fewer cells, with less distinct granules, and is less vascular. Many of the cells are converted into hyaline material which passes into the *pars nervosa.*

(5) The *pars nervosa* is mainly composed of neuroglia, but it also contains the hyaline material just mentioned and numerous interstitial granules. This material is traceable into the cerebrospinal fluid within the infundibulum of the third ventricle. Probably both the hyaline and granular material are derived from cells of the *pars intermedia.*

(6) There is usually a cleft in the middle of the gland along which the organ is easily separable into an anterior and a posterior lobe. The posterior lobe thus separated contains most of the *pars intermedia* and the whole of the *pars nervosa.*

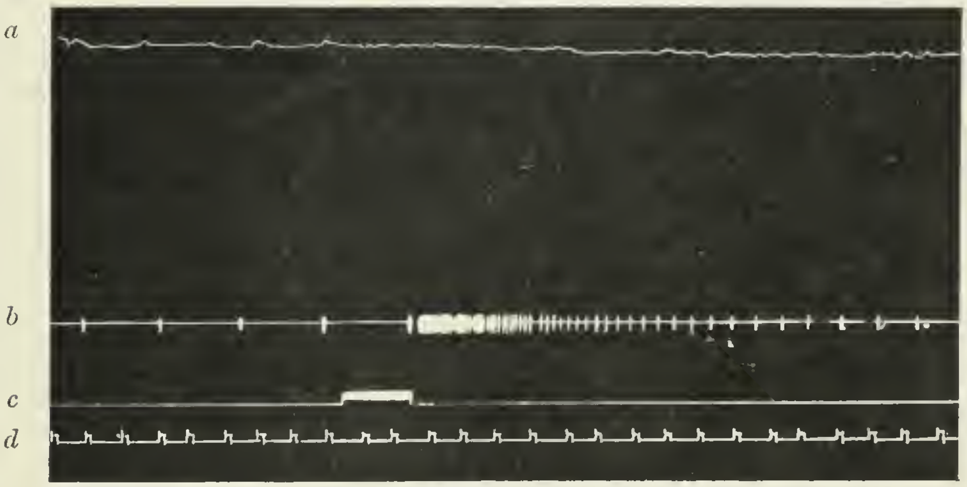


FIG. 14.

Effect of the injection into the jugular of cat of 1 c.c. of extract of pituitary of skate (*Raja batis*) (Herring). *a*, tracing of carotid pressure ; *b*, drops of milk from incised mamma ; *c*, signal of injection ; *d*, time in ten-second intervals.

(7) The anterior and posterior lobes appear to serve different functions ; the anterior lobe being related to the general growth of the body, and especially of the skeleton, whilst the posterior lobe, which includes the *pars intermedia*, probably serves to promote the contractility and increase the tone of plain muscular tissue generally, as well as of the heart, and to excite the activity of certain glands—viz., the kidney and mammary gland.

(8) Some functions of the organ might be conceived to be carried out

through the agency of nerves, but it is much more probable that the gland produces its action by means of chemical agents or hormones which pass either directly or indirectly into the blood, and through this fluid influence other and distant organs.

(9) In the case of the *pars anterior* no such hormone has hitherto been separated. But there is reason to believe that the influence of this part of the gland on growth is not produced through nerves; for in the first place the pituitary receives but few nerve-fibres, and such as there are mainly go to the blood-vessels; and secondly, it is difficult to explain the effect of hyperplasia of the *pars anterior* in producing the hypertrophy of the skeleton which occurs in giants and acromegalics otherwise than by assuming that the enlarged gland is giving to the blood a greater amount than normal of a hormone which stimulates the growth of the skeleton, and probably of connective tissue generally. Such a hormone doubtless passes directly into the sinusoidal capillaries from the gland cells, which are sometimes arranged around the capillaries like the epithelium of an ordinary gland around its alveoli and ducts.

(10) In the case of the *pars intermedia* and *pars nervosa* (posterior lobe) a definite hormone can be obtained in solution. It is, however, doubtful if it has yet been fully isolated, although Houssay claims to have recently succeeded in obtaining it in a crystalline form. There seems no necessity to conclude with v. Cyon that the effects caused by intravenous injection of extracts of the posterior lobe are produced by stimulation of nerves within the gland.

(11) The hormone obtained from the posterior lobe, to which various names—such as pituitrin, infundibulin, hypophysin—have been given, resembles in some of its effects the hormone obtained from the medulla of the suprarenal capsules, but it is both chemically and physiologically a different body, appearing to act directly upon the protoplasm of cells and not, as in the case of the suprarenal hormone, upon that portion of the cell with which the sympathetic fibres are connected.

(12) It is at present uncertain whether there is only one hormone present in the saline extract of the posterior lobe. It is, however, probable that the effects upon secretion are brought about by a different agent or agents from that which causes contraction of involuntary muscle.

(13) The hormone or hormones of the posterior lobe appear to be formed from certain cells of the *pars intermedia*, which undergo enlargement and degeneration into hyaline and granular bodies. These bodies push their way or are forced through the interstices of the neuro-

glial tissue of the *pars nervosa*, where many of them break down into a hyaline material and granules; they eventually pass bodily into the infundibulum of the third ventricle, where they are absorbed by the cerebrospinal fluid. It is probably in this way, and, therefore, by an indirect path, that the hormones of the posterior lobe get into the vascular system.

(14) Some relationship appears to exist between the thyroid gland and the pituitary body. This is indicated by the enlargement of the pituitary body and the formation within it of colloid-containing vesicles, as the result of removal or atrophy of the thyroid. If this relationship indicates a vicarious nature in the functions of these organs it is probably one which is limited to the production of the hormones which affect nutrition, especially that of the connective tissues, since these tissues are known to be influenced by changes both of the thyroid body and of the *pars anterior* of the pituitary body. But that other tissues may also be influenced is evidenced by the symptoms which are produced on removal or destruction of either gland, prominent amongst these being defects of the nervous system.

(15) There seems to be some sort of correlation between the pituitary body and the sexual organs, since in cases in which there is reason to think that deficiency of pituitary secretion exists, a condition of sexual infantilism becomes established, and the secondary sexual characters may remain undeveloped, or, in males, may exhibit a feminine type.

Mr. J. HERBERT FISHER: While appreciating the honour which your Secretaries have done me by asking me to take an opening part in this discussion, I confess that I feel somewhat appalled at the responsibility of following Professor Schäfer on this subject. My own knowledge is but founded on the work of others, coupled with the clinical investigations of typical cases, some of which I have elsewhere put on record.

Into the development of the pituitary body I do not think I need here enter. Its remarkable origin by the fusion of a neural element with an offshoot from the primitive stomodæum is equalled by the complexity of the function of the two portions of which it is composed; by the remarkable symptoms which attend its disorder in either lobe; by its supreme importance to life; by its as yet unravelled interactions with other ductless glands. Much has already been done, but much more remains to be discovered, and at the present, from whatever aspect we approach the problem, we can but place a footstep upon the threshold of an engrossing subject. As to the functions and physiological effects of the products of the hypophysis, you will not expect me to enter. There is, however, one observation on this subject that I should like to mention—the colloid products of the hypophysis are derived from the cells of the pars intermedia; the latter cells are derived from the posterior lamina of Rathke's pouch, and the colloid which they secrete finds its outlet into the ventricular fluids by the infundibular stalk. I have been struck by the fact that colloid is also formed by the rare tumours which sometimes develop in the remnants of the post-anal gut, the neurenteric canal, by which, at the caudal end of the embryo, the alimentary and neural canals are in fœtal life brought into continuity. As regards the function of the pituitary body, we know that both acromegaly and Fröhlich's dystrophia adiposo-genitalis are accompanied by arrest of the sexual functions in the adult, or by their failure to develop if the pituitary disorder originates in infancy. Conversely it is known that castration or oöphorectomy results in some overgrowth of the pituitary body, while the hypophysis, like the thyroid gland, enlarges during pregnancy. I am inclined to think that we do not yet know for certain whether the sexual or the pituitary glands are primarily at fault in these cases. My own clinical observations have taught me that the climacteric is prematurely reached or in the male impotence is usually developed months or even years before any symptoms point to disorders localized in the hypophysis. In this direction, the observations of gynæcologists might be especially valuable; I am inclined to think that they might be the means of adding to our store of knowledge and to our record of cases. One case of my own that seems to have some bearing on this question of priority of lesion is that of a middle-aged man who died about eighteen months after the development of intracranial symptoms from disease of the hypophysis, which can hardly have been anything but malignant, in whom sexual impotence preceded all other symptoms by eighteen months. As regards the other ductless glands, it is, I believe recognized that hypoplasia of the adrenals is accompanied by retarded sexual development, while hyperplasia is associated with excessive development of the secondary sexual characteristics. A case reported by Cushing, and the case shown here to-night by Dr. Turney, which I have had the opportunity of examining, show this feature. There is, at the same time, in these two cases pituitary disorder; together with adiposity we have abnormally raised blood-pressure, hypertrichosis, undue pigmentation of skin, and that liability to spontaneous bleeding and easy bruising which hæmophiliacs also show. Renon and Delille think that extract of the posterior lobe of the pituitary stimulates the adrenals and lessens thyroid function, while extract of the anterior lobe of the pituitary increases thyroid function. In myxœdema, the hypophysis is not uncommonly enlarged and even acromegaly may supervene, as indeed it may follow exophthalmic goitre. Extract of the posterior lobe of the pituitary gland has a diuretic effect by stimulating the secretory cells of the kidney, and this is quite independent of the general rise of blood pressure which it occasions. In disorder of the posterior lobe of the hypophysis the patient develops the power of dealing with very large doses of glucose, but glycosuria will appear if extract of the posterior lobe is administered to the patient.

At this point I should like to quote two interesting cases which I have not yet reported.

The first case is that of Mr. A., aged 29, qualified as a medical man and practising as a barrister, who, on November 13, 1912, fainted and fell on the stone floor of a lavatory, striking the back of his head. He was removed to a nursing home and remained unconscious for a period of fifteen hours. Vomiting followed the accident, and there was a good deal of blood in the vomit. Glycosuria was discovered twenty-four hours after the accident, though the first sample of urine tested after his fall contained no sugar. By diminishing the carbohydrates of his diet, the glycosuria can be readily caused to disappear. He observed that he had lost the sense of smell: the anosmia he first recognized six days after his fall, but it may probably have been present before. The patient, after seeing me, took a holiday for three weeks; on returning he had gained 1 lb. in weight and no sugar was found in the specimen of urine examined, while the sense of smell was returning. The suggestion is that a fractured base resulted in extravasation of blood into the sella turcica beneath the diaphragma sellæ, and its influence on the posterior lobe of the pituitary body, possibly acting as an irritant to its secretion, established a temporary glycosuria. The fields of vision were not affected, and the optic commissure was apparently not involved. Whether the anosmia could under these conditions be reasonably attributed to injury of the olfactory lobes or whether a lateral involvement of the uncinate gyrus can reasonably be invoked, I am not in a position to say. There were no fits, and no olfactory or gustatory aura. It is right to state that the patient's paternal grandfather died of glycosuria at the age of 60, and a male first cousin—the son of my patient's father's brother—died at the age of 15 from diabetes. The fact that the first specimen examined was free from sugar, but that glycosuria, easily controlled by regulation of diet, was present twenty-four hours after the accident, seems significant.[1]

The second case that I wish briefly to report is one of exophthalmic goitre in a young male subject, who died suddenly after developing polyuria and possibly glycosuria. The patient was one M., aged 20, a male, first seen by me at Moorfields Eye Hospital on September 16, 1903. His right eye had gradually become prominent in the preceding ten days. The pulse was 140. He exhibited a fine tremor in each hand, which was accentuated when he got nervous. Graefe's lid sign was present. The thyroid gland was not enlarged, but a week later there was a sensation of tenderness over the site of the gland. Two months later, enlargement of the thyroid gland was quite definite; in January, 1904, there was a definite thrill over it on palpation; the right lobe was bigger than the left. His father had died suddenly six weeks earlier, which had been a considerable shock. Two elder brothers of the patient had had enlarged throats and prominent eyes when at about the age of my patient. The prominence of the eyes exhibited in each case lasted about twelve months, but the throat remained enlarged in one. The diagnosis of Graves's disease in my patient was confirmed by two physicians. The patient's mental condition was always one of nervous excitement and over-anxiety. By June, 1904, under treatment with bromide and belladonna, the symptoms had improved. There was less proptosis. He had gained flesh and there was no pain in the neck. The tachycardia persisted. Treatment was continued until the end of 1904. On October 13, 1905, I learned from his brother-in-law that the patient had been found dead in bed the previous day. His relative informed me that during the last two months of his life he had developed a very large appetite and unquenchable thirst, had lost flesh, and at times was drowsy. I have no note that an examination of urine was ever made at the hospital. In the last two months of his life he had been in the habit of taking quart jugs of water to bed with him and passed an enormous quantity of urine each night. Post-mortem examination was made on the coroner's order, but I was unable to learn that any useful facts were discovered as the result of it, and I am afraid the brain and intracranial condition were not investigated.

---

[1] On March 29, 1313, reported that he is in excellent health, vision unimpaired. For the last three weeks the urine has been free from sugar, on a somewhat restricted and sugar-free diet. Slight glycosuria had persisted till three weeks ago. Sense of smell is still deficient.

As ophthalmologists, the phenomena of pituitary disease with which we are more deeply interested are naturally those dependent upon implication of the visual pathways. The ophthalmic appearances, if any, which we see are those of primary atrophy of the optic disks. In early stages disturbances of function may exist where no pallor is conspicuous, but the evidence of descending change may be expected to be not long delayed. When any intracranial mass exerts pressure directly upon the visual pathways, primary atrophy usually results; we should recollect, however, that slight evidences of papillœdema are sometimes present in association with enlargements of the hypophysis, and that even unilateral choked disk may be present in the late stages of pituitary tumours: the more extreme papillitis has usually been found associated with complete primary atrophy of the other optic nerve: the growth is raising the general intracranial pressure, while one optic disk is sheltered from the effects of such pressure by the direct involvement in the tumour mass of the intracranial portion of the optic nerve and of the optic foramen. In pituitary cases, as in all cases of degenerative change in the optic nerve, the wise ophthalmic surgeon hesitates to pronounce on the amount of vision which an eye with a pale optic disk may be expected to retain.

Much painstaking work has been done with the object of tracing in minute detail the various fibres and bundles of fibres of which the optic nerves are composed; most attention has naturally been devoted to the papillo-macular fibres, and the course of such of these as decussate in the optic commissure. I confess that, for the purpose of clinical diagnosis, we are not as yet able to put such knowledge to much practical use, and it would be of but little assistance to us to enter upon it here. With the broad facts of the crossing of the fibres from the nasal half of each retina, including a large decussation of the macular fibres, in the optic commissure everyone agrees. It is also generally admitted that in the optic tracts the fibres which have crossed in the commissure from the opposite side are found to occupy an inferior and peripheral situation, while the uncrossed fibres form a bundle centrally placed. With Gudden's commissure, which has no visual function, we are not concerned, but we might in cases of pituitary disease keep its presence in mind to see if there be any constant symptom to suggest an explanation of the function of this bundle.

The ophthalmic surgeon works chiefly with his perimeter in recognizing and observing pituitary disease. For want of perimetry in cases of optic atrophy I feel sure much interesting material is overlooked. The typical condition is one of bitemporal hemianopia, but the statement by no means covers the question. Nettleship[1] emphasized for us facts which Förster, Treitel, and Doyne had previously pointed out—viz., that cases of central scotoma, at first glance simulating tobacco amblyopia, exist, in which extension of the scotoma eventually results in bitemporal hemianopia. Taking into consideration the large size of the macular bundle, Nettleship thought that disease involving the anterior

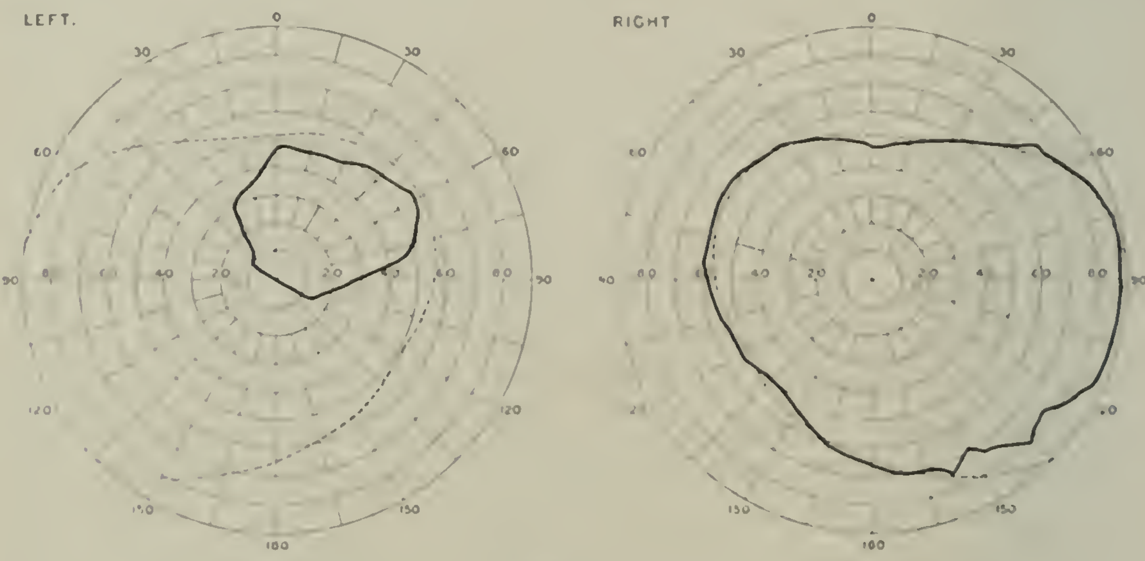


Fig. 1.

W. L. M., October 2, 1911.

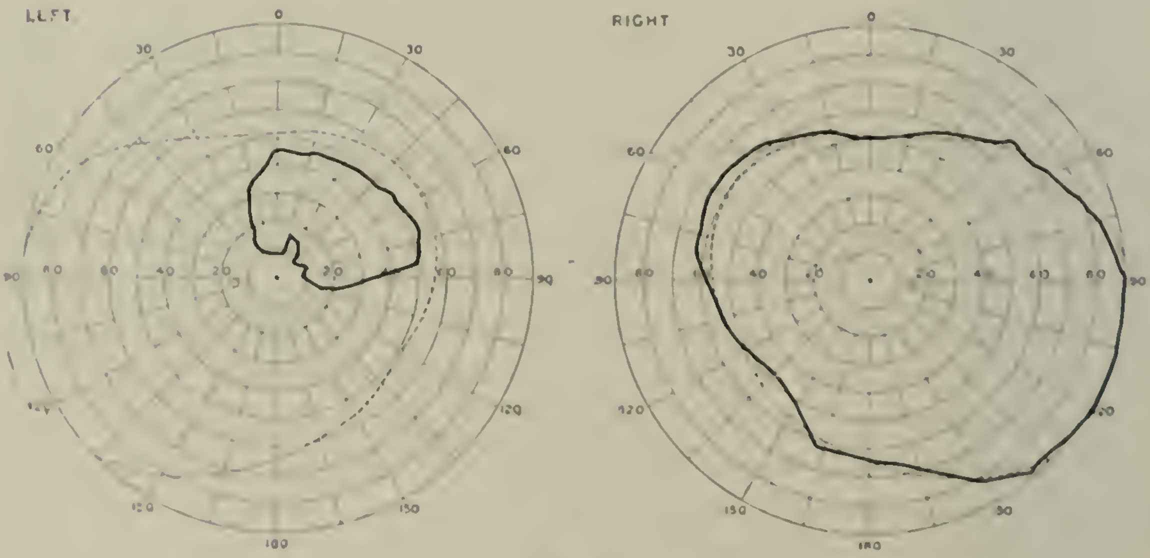


Fig. 2.

W. L. M., December 13, 1911.

---

[1] *Trans. Ophthal. Soc.*, 1897, xvii, pp. 277-99.

angle of the commissure might explain these cases and their progress. Dean and Usher's experiments are probably the most conclusive as to the course of the macular fibres in the chiasma. My difficulty in regard to pituitary tumours is to conceive how they can press first at the

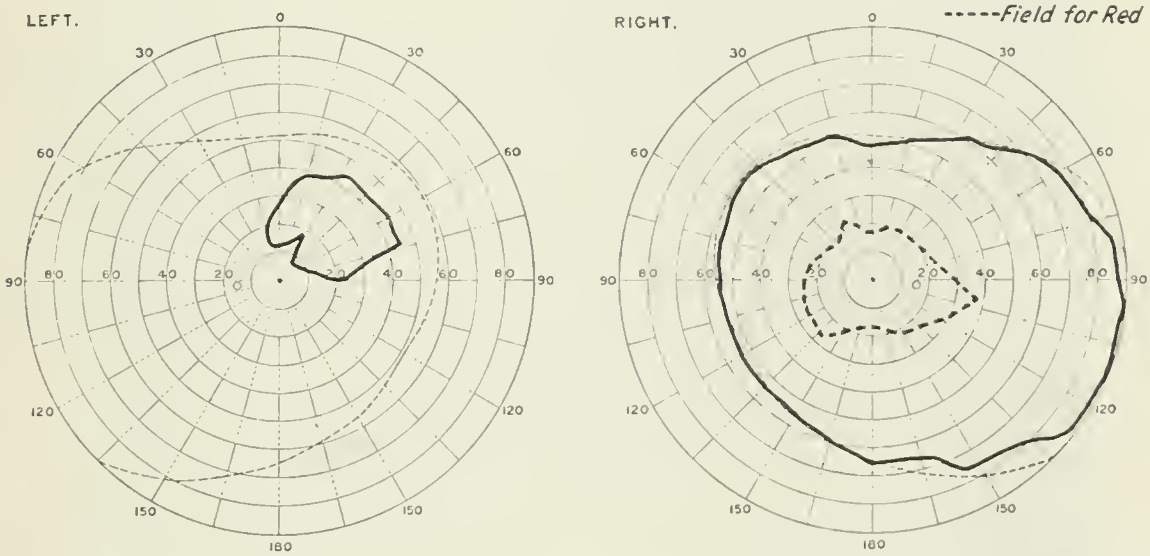


FIG. 3.

W. L. M., February 14, 1912.

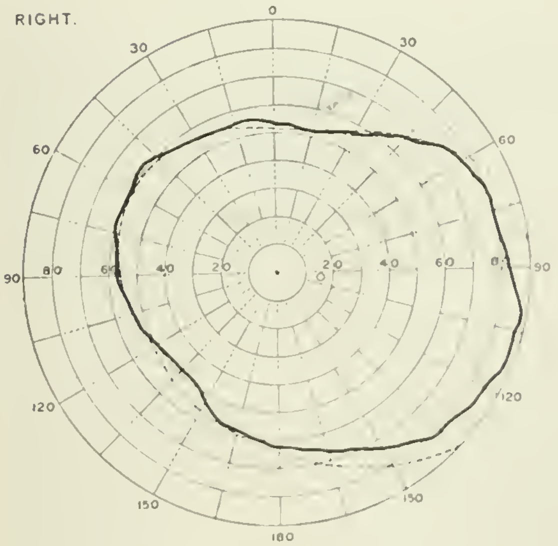


FIG. 4.

W. L. M., July 30, 1912.

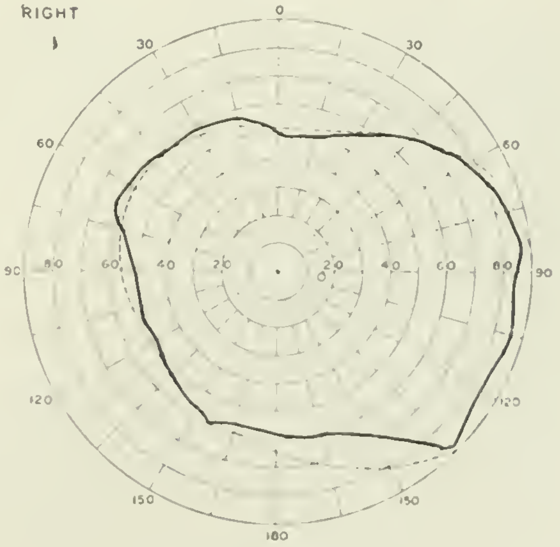


FIG. 5.

W. L. M., September 10, 1912.

anterior angle of the commissure—if they had eroded the anterior inferior wall of the sella turcica, invaded the sphenoidal air cells and then extended through their roof, they might reach the required point. In Nettleship's cases there was no evidence of sinus disease; nowadays, we have the advantage of X-rays to eliminate or prove bone erosion. I can narrate a case of pituitary tumour with an expanding central scotoma as the first symptom in the second eye, when the first was already blind. X-rays show destruction of the dorsum sellæ, but none of its anterior wall or floor.

W. L. M., male, aged 34, somewhat myopic and wears full correction. Found vision defective in the left eye about fourteen months before I saw him at the beginning of October, 1911. He had observed that the sight failed in the left eye from the left-hand side, so that he could see in front only by looking sideways with it. He had found nothing wrong in the right eye. He had no symptoms of intracranial pressure. An X-ray examination in South Africa had revealed enlargement of the sella turcica, but he was not acromegalic, though he had had to obtain rather bigger boots and a slightly larger hat. The right eye had full acuteness of vision. Direct vision was lost in the left eye by the date he first came to me. The left disk was pale and showed the appearance of primary optic atrophy. The right eye was sound in all respects, and with corrected myopia read $\frac{6}{6}$ well. The fields were charted and are exhibited. He returned at intervals of one month. On December 13, 1911, he had had slight stabbing pains in the

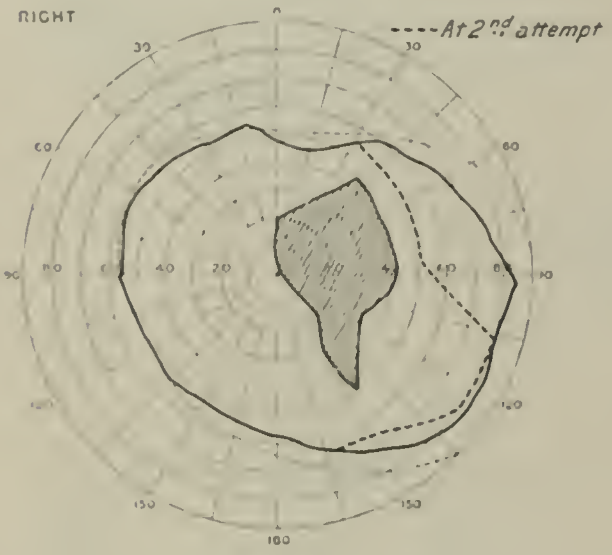


FIG. 6.

W. L. M., January 6, 1913.

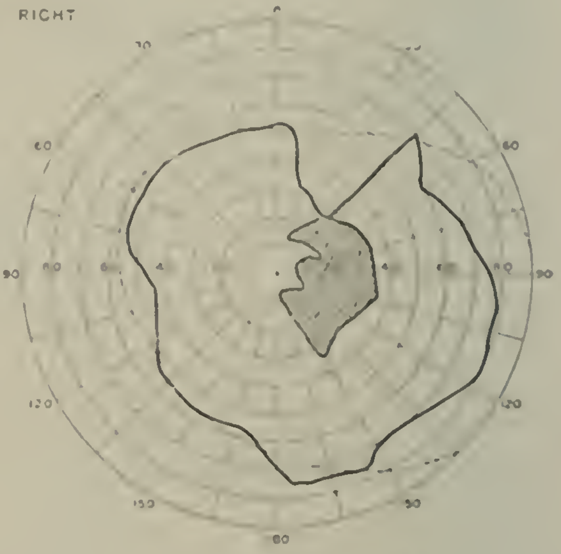


FIG. 7.

W. L. M., February 11, 1913. Scotoma not increased. Any field for red is entirely in the nasal half; he recognizes no red to the right of the vertical meridian.

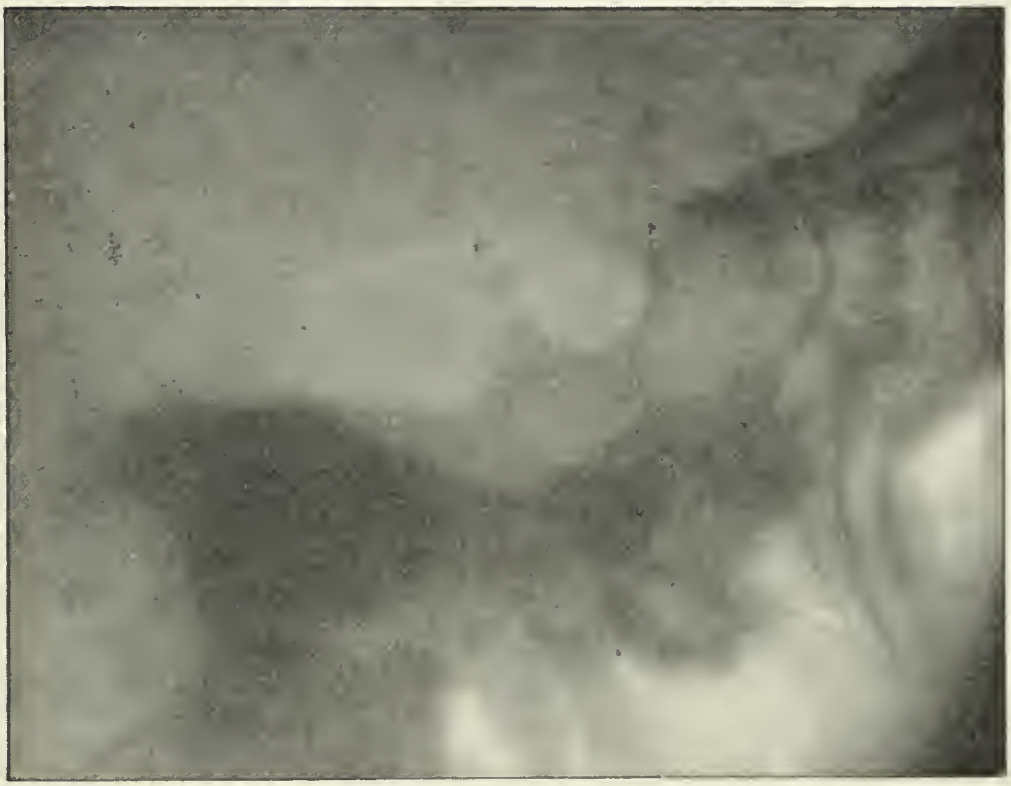


FIG. 8.

Skiagram of normal sella turcica, obtained from a patient with bitemporal hemianopia.

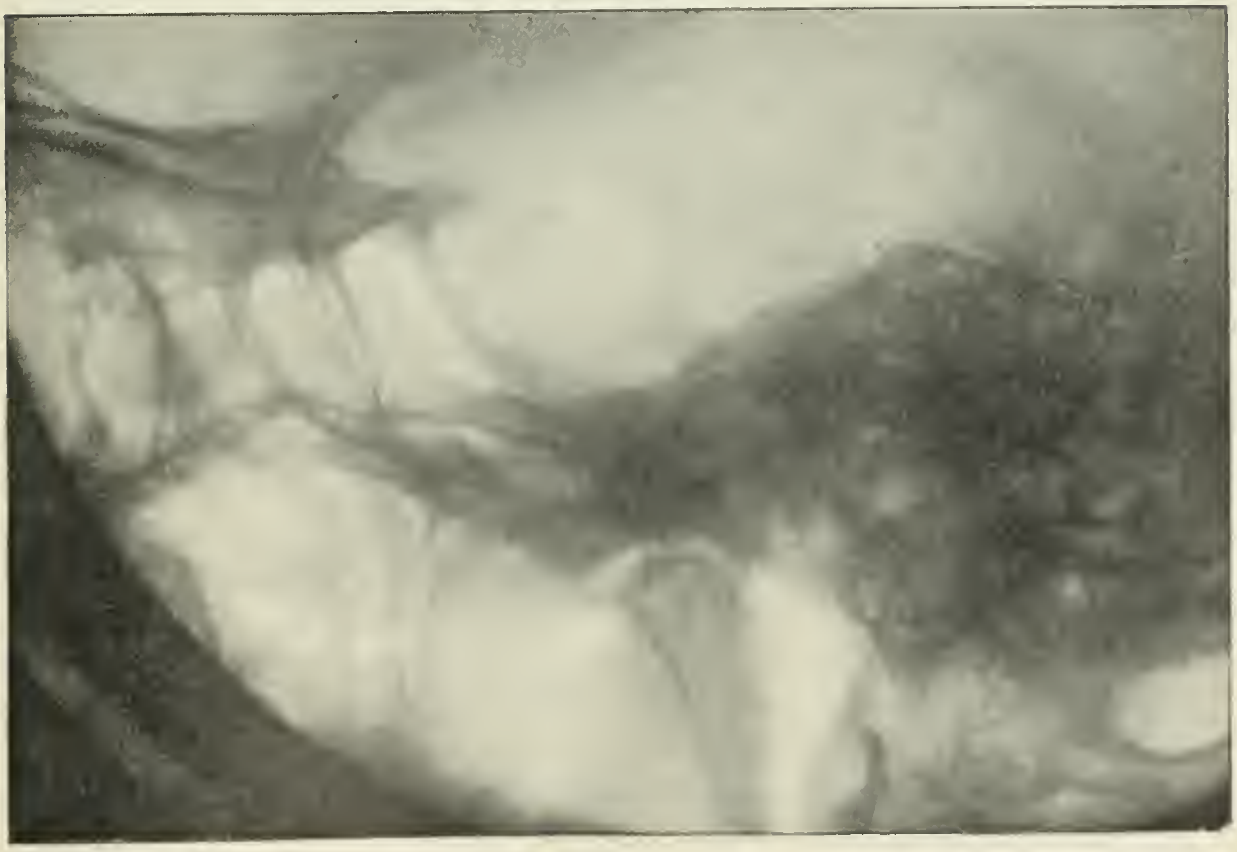


FIG. 9.

W. L. M. Anterior limit of sella turcica undisturbed, posterior boundary eroded and vague.

temples on a few occasions. I could get no better direct vision in the right eye than $\frac{6}{9}$, as against $\frac{6}{6}$ previously. I could detect no central scotoma, but thought the direct vision was really worse than previously, and that the colour of the right optic disk was doubtfully as good as two months earlier. The vision of the left slowly became worse, until all perception of light was lost. In February, 1912, I examined the right colour field, but there appeared to be no pathological disturbance of it. In May of last year he began to draw attention to what appeared to be the earliest evidence of a central scotoma in his seeing eye, and by the end of July told me that he sometimes saw half a word or missed the end of a line in reading. By this date the right disk was undoubtedly paler than when I first saw him, but the field remained quite full. The direct vision was $\frac{6}{9}$ and 1J, and the field unaffected in September, when he left this country. During the eleven months he had been at home he had been treated with thyroid and pituitary extracts, but not in large doses. Six weeks after he left England a definite scotoma was observed and charted in Bulawayo. He determined to return once more to England, and I confirmed the scotoma with the perimeter on January 6, 1913. It is extending from the fixation point into the temporal field, and it seems that there is also some peripheral contraction of the temporal field threatening to fuse its loss with the scotomatous area. The colour field for red was further investigated in February, 1913. It has become reduced now to very small dimensions, and this colour is not now appreciated at all to the temporal side of the fixation point—the red field resides entirely in the nasal half. There can now be no doubt about the pathological pallor of the right disk. The direct vision still remains $\frac{6}{9}$ with his glasses. He was inclined to think that there had been some improvement in the sight of his eye since a definite hemianopic field was charted by Woods in Cape Town in December, 1912. He has been now put upon much larger doses of pituitary extract—both lobes.

The case illustrates the development of a temporal hemianopia by an expanding central scotoma. There was no real evidence of acromegaly, nor did he show any complete train of Fröhlich's symptoms. He has the pallid, colourless complexion to which attention has been drawn in pituitary cases. The erosion of the dorsum sellæ by the expanding growth has been confirmed by an X-ray examination made in this country by Dr. Ironside Bruce (fig. 9).

On the other hand, I have another case, which I have not yet reported, in whom, with total blindness of one eye, the vision in the other is beginning to be affected in what I have previously suggested is the most usual way—viz., by a loss of temporal field which first reveals itself in the upper periphery.

Mrs. F., aged 42, first saw me on June 14, 1911, her vision having begun to fail about seven and a half years earlier in the left eye only. She had suffered from more or less headache during this time over the vertex, but latterly more generally over the head. In a few months the left eye had no perception of light. Some twelve or

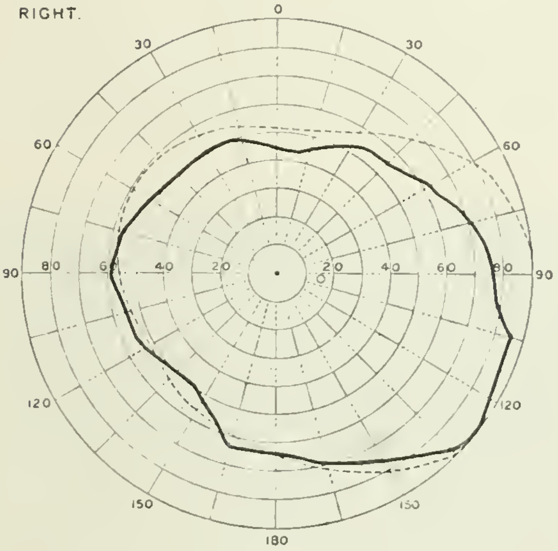


FIG. 10.

Mrs. F., June 14, 1911.

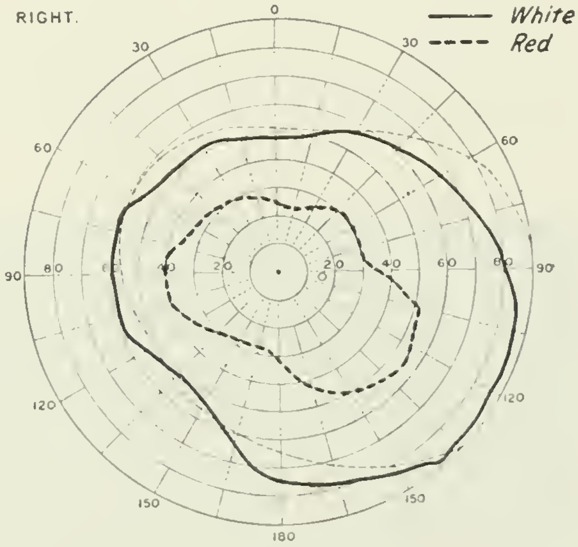


FIG. 11.

Mrs. F., July 2, 1912.

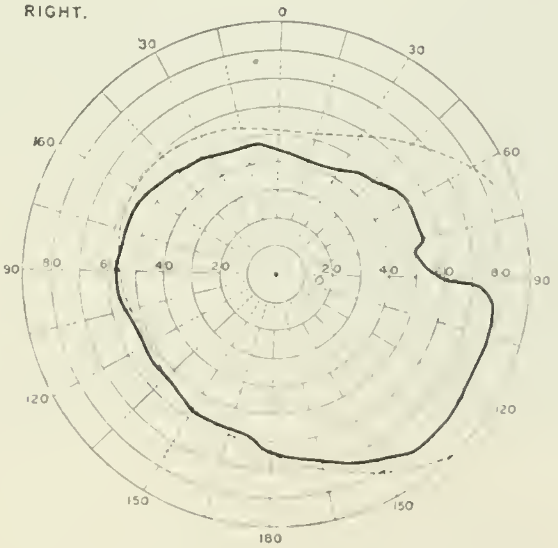


FIG. 12.

Mrs. F., December 31, 1912.

eighteen months before the failure of vision, catamenia became irregular, and the last period occurred about five years before I saw her. Her average weight used to be about 11 st.; when the sight first went wrong it fell to 9 st., and at the date of her visit to me she weighed about 13½ st. There was no disorder of smell, no enlargement of hands, feet, or features. Some drowsiness lately. The eyes were rather prominent, with a divergent strabismus in the left, but no limitation of movement. The vision of the right eye was full, and the field quite normal. The left disk showed the features of primary atrophy, with the retinal vessels of good size. A skiagram of the skull was taken about this date, and again some months later. The first skiagram was not satisfactory; the second ones, taken by Mr. A. D. Reid, show marked erosion of the sella turcica (fig. 13). For the first six months under treatment with thyroid extract the pains in the head were greatly relieved. There was no drowsiness. In no other respect was there any change. The treatment was continued. Twelve months after her first visit conditions were the same. The field of vision was charted both for white and for red. The right disk remained a good colour. The headache, which had been much relieved by her treatment at first, was again severe during the latter half of last year. I am of opinion that her features are somewhat more acromegalic, although not conspicuously so. The hands are large. Perhaps the most reliable observation is that whereas in January, 1912, I noted that the lower jaw was not prognathous, although the incisor teeth met each to each, at the present date the lower incisor teeth are distinctly in front of those of the upper jaw. At my last observation, some two months ago, the right field was showing a loss at its upper temporal periphery. Comparing this with the fields of July, 1912, it may be remarked that the field for red at the former date suggests the loss which at the present time quite certainly exists in the field for white. The severe pain still continues. Treatment has been modified to 5 gr. of Armour's extract of the whole pituitary gland, and 5 gr. of thyroid extract daily. The right disk still appears normal. The question of an operation for decompression of the pituitary body will have to be considered in this instance, unless the pain can be alleviated.[1]

This case may be quoted in some slight support of what Mr. Doyne has advanced—viz., that hemianopia of the colour-sense may precede that of the form-sense, and give us a guide for prognosis. Cushing agrees, and has reported cases, and I believe Mr. Treacher Collins could quote us a case in support. Perhaps, in favour of disturbance of the colour-sense as an early phenomenon is the fact that patients often complain that they see everything as if through a "blue haze."

---

[1] I last saw this patient on April 14, 1913. She died suddenly on the evening of the same day. She had for a few weeks had slight transient attacks of loss of consciousness, accompanied by rigidity and retraction of the head. These attacks had invariably occurred when she was in bed at night.—J. H. F.

We have also to recollect that in a proportion of the cases of pituitary body enlargements, homonymous hemianopia is the symptom in the earlier development of the case; indeed, it is said to be about half as probable as a bitemporal hemianopia. I am quite certain that an evenly balanced loss of temporal field in each eye of simultaneous onset is the exception and not the rule. In many cases one eye is already blind, and we learn by the history that its vision went from the temporal side only when the patient first consults us for failure of the second eye; such failure is found to be developing, as an upper temporal loss of field,

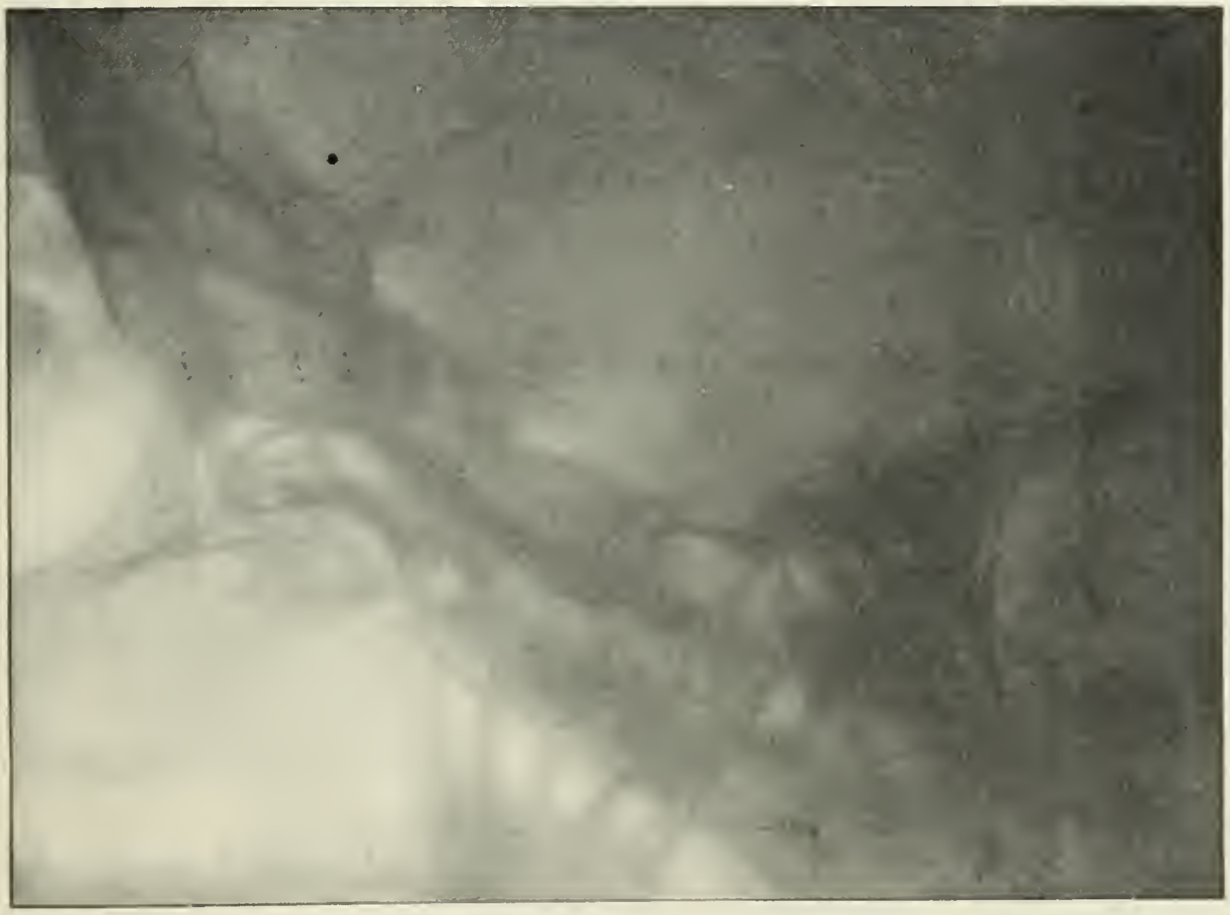


FIG. 13.

Mrs. F. Outlines of sella turcica completely lost.

perhaps preceded by a more advanced hemiachromatopsia, or as a central scotoma expanding into the temporal field. Moreover, there are cases where one eye having reached total blindness, while the other preserves the nasal field, some change in the incidence of the lesion exactly reverses the visual result in the two eyes. Optic nerves are not in these cases always as atrophic as the pallor of their papillæ would suggest, and the successes as regards recovery of vision of cases where pituitary cysts have burst or been evacuated by operation must be borne in mind.

We have gone far enough to enable us to appreciate that the visual symptoms dependent upon enlargement of the hypophysis are variable, and that direct pressure on the optic chiasma, so glibly invoked, is far from being a satisfactory explanation of most of the cases. It is quite true that experimentally a sagittal section through the middle of the chiasma would cause immediately a symmetrical bitemporal hemianopia. Can we conceive of a tumour originating in the interpeduncular space producing by its pressure on the chiasma effects so definite and precise? It would require almost a knife edge to do it; the transverse measurement of the whole chiasma, including the non-decussating fibres at each lateral angle, is not more than ⅜ in. It is even still more difficult, on this generally accepted basis, to explain the cases of bitemporal hemianopia which develop by an expanding central or paracentral scotoma. I have quoted a case this evening where one eye having become completely blind, its original failure starting by loss of, or in, its temporal field, failure is now advancing in the other eye by means of a scotoma expanding into its temporal field, after at least a year of interval. Simultaneous and anything like symmetrical development of bitemporal hemianopia is not common in the cases we are considering. Homonymous hemianopia may be the feature. In my experience loss of one temporal field, followed by loss of the nasal field in the same eye, and after an interval by loss of the temporal in the other eye, is as common a sequence of events as the development of a bitemporal hemianopia: it seems likely that half-vision fields for the colour-sense may precede hemianopia of any character when caused by pituitary enlargement. Cases which indicate undoubted change in the incidence of the injurious pressure are on record, as well as those of unexpected recovery after spontaneous rupture or operative tapping of cystic swellings. The pituitary body is securely ensconced in the bony sella turcica, its stalk depending through the small aperture in the diaphragma sellæ of dura mater. When it enlarges skiagrams prove that it expands most often by erosion of the posteriorly overhanging dorsum sellæ; the anterior boundary of the sella turcica is seldom disturbed. Tumours of the hypophysis may burst into the sphenoidal air cells anteriorly and thence through their lateral walls into the orbits ; the initial bony difficulty having been overcome the growth secures room for unimpeded extension in these directions. Laterally the cavernous sinuses bound the sella turcica, the bony walls being here deficient ; the sinuses are very tough and offer firm resistance; the third, fourth, or first division of the fifth nerve in the outer wall may be, though they are but rarely, implicated by pituitary tumours ; the sixth nerve in the floor of the sinus groove under the carotid artery still more rarely is pressed upon. Anosmia is not uncommon —in post-mortem examinations, the olfactory lobes, or their roots forming the antero-lateral boundaries of the anterior perforated spots, are often found to be involved, but this is in the last stages of the disease. I should be glad to know whether neurologists think the anosmia present in a proportion of pituitary cases could be attributed to involvement of the uncinate gyrus. Epileptiform attacks ushered in by an olfactory or gustatory aura are not uncommon.

Personally, my cogitations are leading me to the conclusion that the visual phenomena in many of the cases are explained by traction effects on the visual pathways as the tumour extends upwards behind the chiasma and between the optic tracts in the inter-peduncular space. A tumour fairly symmetrical in outline would stretch the decussating fibres in the chiasma, while in no way dragging on the direct fibres, and give us a bitemporal hemianopia ; it is conceivable that the highly specialized function of the macular fibres might be more readily injured than that of the other fibres in the chiasma ; on a traction hypothesis the expanding scotoma cases are to be understood, and hemiachromatopsia can be recognized as a symptom which it would be very difficult to accept on a direct pressure hypothesis. If the tumour mass, having already caused a bitemporal hemianopia, increased now more to the right than to the left side, it would probably drag on the left optic nerve as a whole, or accentuate the angle between the left optic nerve and the left optic tract; in either way the fibres from the temporal half of the left retina would now suffer by dragging, and the eye would be rendered blind ; the tumour expanding to the right would diminish the acuteness of the angle or curve formed by the right optic nerve and the right tract, and the uncrossing fibres from the right retina might long preserve their function.

A pituitary tumour growing in the interpeduncular space asymmetrically and from the first lying more to the right than to the left of the median line might, I think, be expected to injure by traction first the decussating fibres from the left optic nerve and then its non-decussating fibres before any fibres of the right optic nerve became unduly stretched; as the crossing fibres from the right retina became involved, loss of temporal field on this side would be expected to occur, either centrifugally or centripetally. The possibility that a displaced optic nerve may receive injurious pressure from the bony optic foramen on that side towards which it is displaced can also be conceived. In the rarer cases of homonymous hemianopia direct pressure on the optic tract concerned is, no doubt, the true explanation; in the tract the uncrossed fibres seem to be afforded the more sheltered situation.

I think the idea of traction, rather than of direct pressure, fits in better with the clinical facts and the anatomical possibilities. I am inclined to think also that it is more compatible with the recovery of physiological function, which in a few fortunate instances has occurred.

The question is one which may be of interest not only from an academic, but from a very practical point of view. Although up to now operative treatment of pituitary tumours has been in the direction of reaching the sella turcica, either for decompression or in the rather futile hopes of meeting with a cyst or removing a growth, by the transnasal route, it seems likely that a safer and more surgical method may be devised through a fronto-temporal opening of the cranium. In the hands of a cerebral surgeon who recognizes his own limitations and those of his patient, this route seems the more hopeful. The decision of the points I have raised may be of the first importance in enabling the surgeon to decide from which side to attack the growth.

One more question: If this is to be the method, would a free removal of the bone and opening of the dura mater on the opposite side at the same time allow any more freedom for elevation and displacement of the brain, and thus give more ready access to the pituitary region? For experimental purposes on dogs Paulesco found this bilateral opening of much assistance. The point could be readily settled by a surgeon on the cadaver.

(The discussion was adjourned until March 12.)

Sections of Neurology and Ophthalmology.

COMBINED MEETING.

March 12, 1913.

Dr. H. H. TOOTH, C.M.G., President of the Neurological Section, in the Chair.

Discussion on Disease of the Pituitary Body.[1]

DR. H. G. TURNEY: I feel that I can hardly proceed to the remarks which I propose to make to-night without some reference, however short, to the memorable meeting of last week. It was memorable for the remarkable collection of cases which must have aroused the minds of even the least imaginative amongst us. I can only liken it to a scene from a new Gulliver's Travels where cheek by jowl one met Lilliputians and Brobdingnagians, and where, as a friend of mine humorously put it, everyone seemed to be of the wrong age and of the wrong sex or no sex at all. Professor Schäfer in his luminous address laid stress on the complexity of pituitary products and hinted at the possible independent action of the different elements. Much has already been done by pharmacological research to identify and separate these various constituents, but disease often affords a finer analysis even than the laboratory, and as the knowledge of these conditions becomes more widely spread we may expect by the recognition of atypical cases and their dissection in the light of physiology, pharmacology and pathology to make still further advance. Harvey Cushing's monumental work shows what is possible even for a single man to achieve by this combination of experimental research and clinical observation. It is mainly due to him that the broad lines of pituitary disease have been laid down and that the time has now arrived for humbler workers to contribute some quota by the observation and analysis even of isolated examples. That is my excuse for venturing in a debate such as the present to weary you with the discussion of a single case. The patient is the one whom I showed at the meeting last week as a possible example of pituitary and adrenal syndrome. The symptoms which may be referable to the pituitary concern mainly the posterior lobe, and I will premise by reminding you in the fewest words possible of the various ingredients of that secretion which may be recognized by their physiological or pathological effects. Professor Schäfer gave some description of the first four on the list last week.

---

[1] Adjourned from March 5.

(1) The pressor constituent which acts on the blood-vessels.

(2) The depressor constituent (clinically latent so far as one knows).

(3) An element which acts directly on the kidneys, producing polyuria not dependent upon changes in blood-pressure.

(4) The galactogogue principle also independent of the others.

(5) A constituent which has no effect upon the blood-vessels, but throws the uterus into strong contraction. I am not aware if this has been shown to have any relation to the galactogogue element, or how the two together are related to the element responsible for the nutrition of the generative organs.

(6) A constituent which controls carbohydrate metabolism without evidence that it operated through the pancreas. It is the deficiency of this element which is held responsible for the adiposity seen in pituitary disease.

Summarizing these statements, we find in the posterior lobe factors which act upon: (*a*) The circulation; (*b*) the sexual organs; (*c*) carbohydrate metabolism; (*d*) the urinary system.

Miss A. O., aged 25, had always enjoyed good health and was not in any way either physically or mentally abnormal until about the year 1907. Before that her menstruation had been regular; since August of that year it has been completely absent. At about the same time her friends first noticed that she was growing stout and this tendency has troubled her ever since. For the past two years she has noticed that she bruises with undue readiness, especially about the legs. This peculiarity has never affected the trunk and there have been no other indications of a haemorrhagic tendency. Her other great trouble is pain in the back, which starts from a kyphotic curve in the upper dorsal region and travels round the ribs. Mentally she seems unchanged. Her spirits are good, her sight unaffected except for the error of refraction which she has always had. She is constantly occupied, and gives no indication whatever of mental torpidity. Even in midwinter she prefers to be in the open air and rather resents the temperature of a ward that is only comfortably warm for the average person. In view of this it is surprising to find that her temperature is persistently subnormal, while on the other hand the pulse is unduly rapid. She has been tried repeatedly with thyroid extract, but this has had to be given up each time on account of palpitation. For a time her weight went up, the maximum being nearly 11 st., but it has now fallen back to its original level, or even below it, and this in spite of an apparent increase in obesity. Her height a year ago was 5 ft. 2 in., but it is now only 4 ft. $11\frac{1}{2}$ in., the result no doubt of the increasing kyphosis.

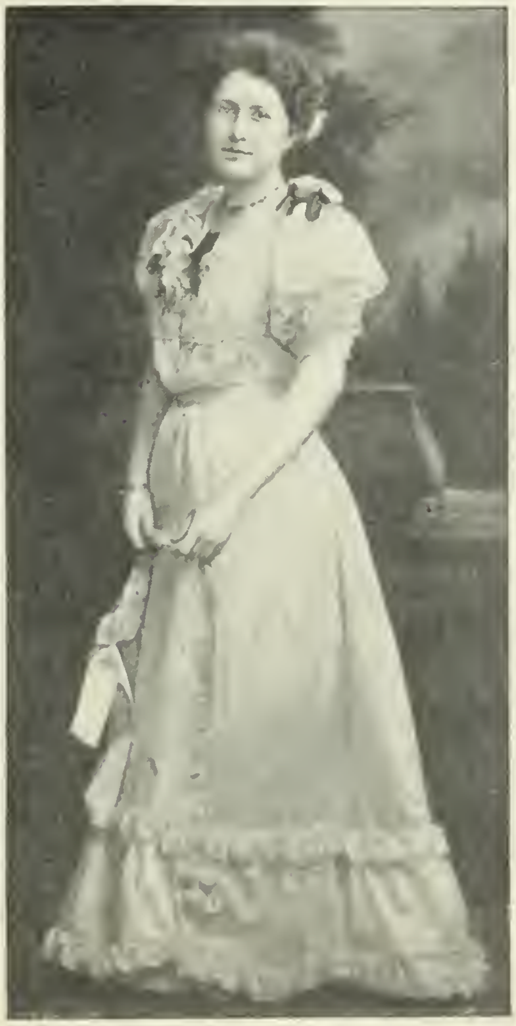


FIG. 1.

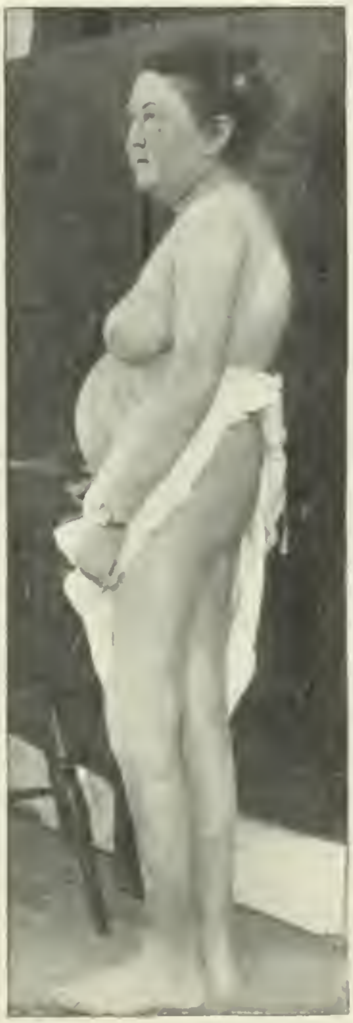


FIG. 2.

Fig. 1.—Patient at the age of 20 (i.e., five years ago).
Fig. 2.—Patient at the present time (1913), aged 25.

On examination the appearance is very striking (fig. 2). The face is extremely fat and the colouring highly florid, the tint of the cheeks being intense. There is no puffiness about the eyes and the texture is firm. The hair is dry and somewhat scanty but the eyebrows are present. The expression is bright and the manner alert. Articulation is clear and quick; the voice is high-pitched, probably a personal peculiarity only, but giving a slight suggestion of child-likeness rather than childishness. Trunk: There is a marked kyphotic curve in the upper dorsal region, and the pain to which reference has been made extends round segmental areas fairly corresponding to this level. The skin is always absolutely dry but not harsh. It is somewhat hyperæmic but not pigmented. Pubic and axillary hair is scanty. Over the back a close inspection shows a growth of fine short hairs equally distributed over the whole area. There is great obesity both of thorax and abdomen, and over both are numerous broad red atrophic areas. The mammæ are pendulous and the abdomen has the contour of a full-time pregnancy. Upper limbs are of normal size and present no abnormality except a tendency to bruising on slight pressure. The fingers are tapering and the patient is constantly engaged over fine needlework. Lower limbs: The contrast between the obesity of the trunk and the attenuation of the lower limbs is remarkable. The thighs in particular are quite abnormally thin, as also are the buttocks. Below the knees the colour is of a dark brown, interspersed with that of recent hæmorrhages. The skin has a parchment-like texture, and the subcutaneous tissue seems to have disappeared, so that the anterior aspect of the shin might be one extensive pigmented scar. The feet are normal and not œdematous so long as the horizontal position is maintained. The ductless glands: The thyroid can be felt and is normal in size and consistency. There is no evidence of enlargement of the thymus, of lymphatic glands or spleen. Pituitary body: Mr. A. D. Reid's X-ray examination shows partial absorption of the posterior clinoid processes and expansion of the sella turcica (fig. 3). It may be noted here that there have never been any signs of increased intercranial pressure or of involvement of the nervous system in any respect, though just lately the patient has made some complaint of headache.

On July 29, 1912, Mr. J. H. Fisher made the following report: "I have charted fields for white, blue, and red. The fields are not transposed. No certain evidence pointing to any probable development of temporal hemianopia, but contrasting the two fields, there does seem to be a small loss in the upper temporal field of the left eye, both for white and colours." A recent examination by Mr. Fisher has not, however, shown any further change in this direction, but "surrounding four-fifths of the right disk there is now a subretinal exudation of glistening character and ill-defined limits; it may have been preceded by a hæmorrhagic extravasation, but there is no blood there at present, except two or three very tiny petechial spots on the white area. Otherwise each fundus is normal. No atrophy of optic nerve fibres."

Circulatory symptoms (? of adrenal origin): Apart from the tendency to hæmorrhage, these are: (1) High blood-pressure; this was 200 mm. of mercury on admission, and has remained in the neighbourhood of that level ever since, the lowest reading being 185. (2) Tendency to polycythæmia without other changes in the blood. On one occasion the red cells reached to over 8 million, on another to over 6 million, but at the last count they had dropped to 5 million.

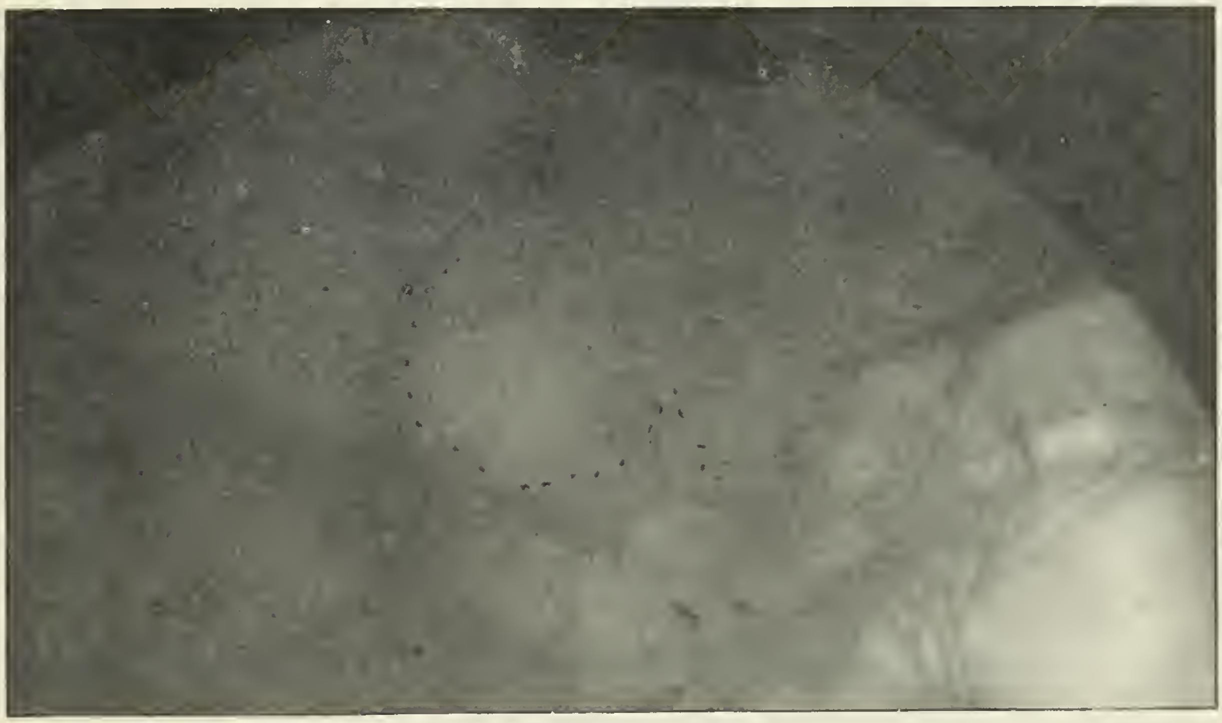


FIG. 3.

The expanded outline of the sella turcica is indicated by black dots.

The only fresh event, apart from some accentuation of the general condition, which has happened since the patient's admission, is a spontaneous fracture of the sternum between manubrium and gladiolus. No X-ray changes have been detected, but the situation of the sternum is not one that readily lends itself to that form of examination. The urine is normal to ordinary tests, and there is no polyuria. The sugar tolerance limit is normal at about 120 grm. of lævulose, and remained unaltered after the ingestion of pituitary extract.

Professor Dixon has kindly examined a specimen of urine, and reports as follows: "It is certainly remarkable in that it contains a pressor substance in considerable quantity; 10 c.c. of the urine injected directly into a cat raises the blood-pressure 70 or 80 mm. of mercury. A similar injection of normal urine will lower the blood-pressure nearly to the base line." Reporting on a second specimen, Dr. Dixon writes: "The last sample contains less pressor substance than the first. As you know, all meat-eaters show some pressor substance in the urine, but to detect it it is necessary to evaporate down and extract about a litre of urine. An exception to the above is in people with high blood-pressure who have been supposed to retain these bodies. Your patient's specimen, however, contains one hundred or more times the quantity of pressor substance found in normal urines." In conversation Dr. Dixon informs me that the urine from this patient corresponds very closely to those that he examined recently from two cases of acromegaly. Further observations are being made, and the above must be regarded as a provisional report, but it goes strongly to support the theory of a pituitary origin for some, at all events, of the patient's symptoms.

Opotherapy with pituitary substance had no effect. Extract of posterior lobe was given, at first subcutaneously, but this method had to be abandoned on account of the tendency to superficial necrosis. That the preparation used was an active one was shown by the elevation of the blood-pressure from 200 to 220 mm. of mercury. Then tablets (Armour's) were given in 3-gr. doses three times a day for several weeks; during this time the patient's weight remained practically stationary, and there was neither polyuria nor glycosuria. To test the thermic reaction, Armour's extract of anterior lobe was given in doses of 4 gr.; it could be obtained in the solid form only, and was thus not adapted for hypodermic administration. The effect was negative, this result being no doubt due to the method of administration. Recently, by the courtesy of Messrs. Parke, Davis and Co., through Dr. Wilfred Harris, some fluid extract of anterior lobe has been obtained and this brings about a very striking lowering of temperature and of blood-pressure when given hypodermically in doses of 0·4 grm. The test was tried twice in this case with the same result, while in controls there was no reaction. Cushing reports this inverted reaction on more than one occasion, but without suggesting any explanation. The positive result is found where the secretion of the anterior lobe is in defect, but I doubt if one can argue that the inverted result means that the anterior lobe secretion is in excess.

Clearly the case is one of a very unusual type, and bristles with difficulties in the way of a diagnosis. The long history of amenorrhœa, together with the obesity progressive up to a certain point, supported as these are by the X-ray evidence of absorption of the posterior boundary of the sella turcica, would appear to be almost pathognomonic of Fröhlich's syndrome—the dystrophia adiposo-genitalis dependent upon changes in the pituitary, and more particularly in the posterior lobe. The complete absence of cerebral symptoms in such a case is of the greatest interest as militating against the view advocated by Bernard Aschner, Fischer, and others, that the changes found in dystrophia adiposo-genitalis are dependent not upon alterations in the hypophysis but upon interference with some hypothetical trophic centres at the base of the brain. But there are various difficulties which have to be faced before the diagnosis of Fröhlich's syndrome can be accepted. In spite of her extremely obese appearance, the patient is losing weight, and at present weighs less than she has done for years past. Without seeing her it would strike one as absurd to talk of obesity at all with a weight of 8 st. 7 lb. The loss of weight does not appear to be the result of treatment, nor is it, I am sorry to say, associated with improvement in the general condition, but rather the reverse. Moreover, and this is a very important point, there is no increased tolerance to carbohydrates, which is almost, if not quite, an essential feature in pituitary obesity. On the other hand, the urine contains a pressor substance which there is strong ground for believing to be associated with pituitary secretion in excess, while the existence of Fröhlich's syndrome, according to our present knowledge, is significant of its absence. Besides these there are many other points of discrepancy: the intolerance to thyroid which nearly always relieves, the hyperæmic condition of the skin, the sensitiveness to heat instead of to cold, the absence of torpidity—all these are the reverse of what one generally finds.

The adiposity itself, too, is of a very remarkable type. One is familiar with adiposity which tends to be limited to the trunk; but in this patient, while the condition of the upper limbs is about normal for a woman of her height, that of the face and trunk is one of excessive obesity, while that of the lower limbs and particularly of the thighs is one of positive emaciation. A very close parallel to the picture presented by this patient will be found in Case 45 of Harvey Cushing, and except for some difference in feature the fig. 283 on p. 219 might be a representation of either. In Cushing's case we find the special type of adiposity, the high blood-pressure, the tendency to hæmorrhage and the amenorrhœa, but in addition, signs of increased intracranial pressure, optic neuritis and limitation of the visual fields, for which a decompression operation was performed with good effect. Cushing reports it as a polyglandular syndrome (? pituitary and adrenal) but also possibly ovarian and pineal. He mentions that he is contemplating an exploratory operation on the adrenal. I was particularly interested in Cushing's report because I had independently come to the same conclusion about my own case, that it was a polyglandular syndrome in which the pituitary primarily and the adrenal secondarily played a part, but on further consideration I do not think that this position as regards the adrenal factor is tenable.

As the adiposity in this case fails to correspond to an uncomplicated type due to pituitary, one has to think of other ductless glands which are capable of bringing about something like a similar result, and for practical purposes these must be either the adrenals or the sexual glands. Taking the adrenals first, the type of the obesity itself is no guide. With adrenal hyperplasia it may predominantly affect the trunk, though as a rule it appears in a generalized form. But adiposity arising from adrenal disease is practically always associated with precocity of development, especially on the sexual side, of which there have been no indications in this case, and with rare and doubtful exceptions, is accompanied by some form of adrenal tumour. So much for the adrenal as an independent agent. I am not aware that there is any evidence that changes in the pituitary are competent to act in such a way upon the adrenals as to set in motion a secondary adrenal symptom-complex.

The circulatory symptoms constitute another very unusual feature in pituitary disease, and it is with regard to these that there is the greatest temptation to introduce a hypothetical adrenal element. But the high blood-pressure is as well explained by the presence of pituitrin in excess, and, as we have seen, the positive evidence points in that direction. The tendency to polycythæmia is, so far as I know, unique in this combination and I do not think that any argument as between pituitary and adrenal can be based upon it. The red cells have now come down to practically their normal number, and as to the exact causation of this symptom, I think that the only plan is to confess one's ignorance. Liability to the occurrence of almost spontaneous bruises has been present throughout the period of observation. With the exception of a probable hæmorrhage into the retina it has been limited to the subcutaneous tissues, and to those of the extremities, particularly the lower ones. This is not an unusual phenomenon in any form of adiposity, though it is seldom so marked as in this instance. I am inclined to account for it by the lowered state of nutrition in the superficial tissues in the presence of high blood-pressure rather than by a general hæmophilic change in the blood. It may be noted here that the fragility of the red cells and coagulation time are both normal. Pigmentation, which one is inclined to put to the credit of the adrenals, is limited to the areas into which effusion of blood has occurred and seems to be purely secondary. One would expect to find it, if it were an adrenal symptom, in the presence of defect rather than of excess. The above are the main grounds which lead me to the conclusion that an adrenal element should be excluded in this case.

The adrenal theory being found wanting, we may now proceed to consider an explanation based upon the intervention of the sexual glands, and here it may be noted that atrophy of the sexual apparatus, with or without indications of preliminary over-activity, is the most persistent element in the various bizarre combinations dependent upon changes in the hypophysis. In reverting again to the distribution of the adipose tissue it cannot be claimed that with a sexual origin this displays, as a rule, any very characteristic type. It will be admitted, however, that a special deposit of fat on the thighs forms one of the characteristic features of the female form, and is in fact a secondary sexual attribute. In a fascinating paper read before the Pathological Section in 1909[1] Mr. Shattock dealt with the occurrence of an exaggerated deposit of fat in this part in certain races from that point of view, and closely allied with this is the adipose deposit over the buttocks which may attain the proportions admired in the Hottentot Venus. Many years ago, too, Professor Sherrington, in the course of his researches on the distribution of the posterior nerve roots, showed that the sexual area in female monkeys extends over a considerable part of the thigh. I would suggest that the disappearance of fat over the lower limbs and buttocks, in this case coincident with its development over the trunk, may be explained by an origin in the sexual organs, though ultimately dependent upon the pituitary.

The last of the symptoms to which I shall refer is the change in the bones. The kyphosis is a very marked feature and is, I need hardly say, constantly met with in disease due to the hypophysis, particularly in acromegaly, and this raises the question of implication of the anterior lobe. The spontaneous fracture of sternum is an example of a lesion which is, I believe, unique in the symptomatology of either pituitary or adrenal disease. Ascoli and Legnani, however, in their records of experimental hypophysectomies, mention the occurrence not only of undergrowths of bone, but of spontaneous fractures. In this connexion one is reminded of the curious inverted reaction to extract of anterior lobe, but I refrain from drawing any conclusion.

---

[1] *Proceedings*, 1909, ii (Path. Sect.), pp. 207-270.

The theory that I advance, then, is that the condition constitutes a pituitary sexual gland syndrome. The lesion is of the posterior lobe of the pituitary and is one of hyperplasia so far as its pressor constituents are concerned, of hypoplasia of the element which subserves the nutrition of the generative organs. That it is the failure of this latter element and not of the one which superintends carbohydrate metabolism that has brought about the state of obesity.

I cannot produce any exact parallel to this hypothetical splitting up of the various active constituents of the pituitary product, but many of the clinical records in Harvey Cushing's book and elsewhere are very strongly suggestive of such occurrence. Another possible alternative lies in a temporary failure of the element which controls carbohydrate metabolism; that this has been in some way repaired, while the results of the failure—the obesity—have persisted. Acromegaly gives many instances of a persistence of the results after the original error of secretion has passed over to the opposite extreme; one would expect that with the bony changes of acromegaly, but hardly with a mobile structure such as fat.

My hearers have no doubt noticed with some surprise that I have swept away one by one the symptomatic props which might be taken as lending support to the theory of an adrenal element in this symptom-complex. My arguments have savoured somewhat of special pleading, and I freely own that, when all is said and done, the superficial resemblance to the group of cases of adrenal tumours is most striking, though in my opinion it is a superficial one only. I am not so anxious to meet with agreement, however, as to stimulate discussion.

Dr. A. E. Garrod gave a short description of a case in which myxœdema and acromegaly probably co-existed. The improvement under thyroid treatment left no doubt of the thyroid defect. The evidence of acromegaly was less conclusive, but X-ray pictures showed enlargement of the sella turcica.

Dr. William Hill rather feared from the trend of the discussion that the question of operative treatment might be regarded as a side issue. Surgical decompression and even partial removal had now, however, been carried out on the Continent and in America in such a considerable number of cases with so much substantial relief that there was every likelihood that a good deal of operative activity would centre around pituitary tumours in this country in the immediate future. He was not qualified to discuss the indications for operation or for deciding when the craniotomic and when the naso-sphenoidal route was to be preferred; but as a nasal surgeon who had recently opened the floor of the pituitary fossa by the simplest nasal method, he felt qualified to criticize from a rhinologist's point of view the formidable technique employed abroad by general surgeons who had embarked on these operations. For the moment surgeons here were likely to be dominated by the teachings of Cushing on account of the brilliant operative experiences and results recorded in his recently published and remarkable monograph. From the point of view of the rhinologist, however, Cushing's favoured method of operating was unnecessarily sanguinary and severe and technically inferior in many respects to the more artistic procedure of Hirsch, a Vienna rhinologist. Cushing had played a meritorious part in showing that the mutilating, extensive and dangerous exenterations of the Schloffer type of operation were no longer necessary, and that excellent access could be obtained to the sphenoidal sinuses by a much less formidable method—viz., by adopting Halstead's modification of Rouge's infralabial operation. But displacement of the external nose, even by a mitigated operation, is not the route which would naturally suggest itself to a rhinologist in order to exenterate the two sphenoidal sinuses, which is after all only one step removed from resecting the floor of the sella turcica. Submucous resections of considerable portions of the cartilaginous and bony nasal septum are of almost daily occurrence in a rhinologist's practice, and these operations are invariably done *per vias naturales*—through one or other nostril. It is true the amount of septum resected is not usually so extensive as is required in approaching the sellar floor, but it is a quite simple and almost bloodless operation to make a large submucous tunnel to the rostrum of the sphenoid, and is often done under local anæsthesia. Rhinologists, not perhaps frequently, but at all events occasionally, open the sphenoidal cavities, and this can always be done through the nasal passages with certainty and precision under the guidance of the eye; and to follow up a large submucous septal resection with exenteration of both sphenoidal sinuses, and removal of their septum, is not an operation which a nasal expert would regard as likely to put special strain on his surgical resource and skill. Should the patient's anterior narial opening be small and it is desired to have a wider proximal end to the long muco-membranous tunnel leading to the sellar floor, it is quite easy to slit up one nostril forwards and upwards as carried out in a recent case by Mr. Graham. The patient that he (Dr. Hill) had operated on at St. Mary's Hospital (at the request of Dr. Leonard Williams, who transferred her to him from the French Hospital) was a pronounced acromegalic with polyglandular lesions, and as the nostril was about twice as large as normal, he had not employed Mr. Graham's modification, but carried out the pure Killian-Hirsch operation. Mr. Graham's auxiliary incisions, either through the nostril as just mentioned, or of fissuring the tip of the nose and columella, as the deviser himself preferred, were, in his (the speaker's) opinion, valuable modifications in the technique of the Killian-Hirsch operation. Of course, our difficulties were not at an end when the sphenoidal sinuses were fully exenterated; to proceed to the removal of the sellar floor had been spoken of as a mere extra step, but, admittedly, if one did not keep a good line, it might be a dangerous step, and it sometimes terminated in a leap in the dark. There should be no danger of wounding the cavernous sinuses and the carotid arteries if one were careful to chisel in the middle line. It is an even more serious matter to perforate too high up, as not only the circular sinus and carotid arteries might be wounded, but injury to the optic chiasma would increase the visual defects which the operation had been primarily undertaken to relieve. Of course, there were some unavoidable risks. We might be unlucky enough, as in the case he (Dr. Hill) had operated on, to encounter a large vascular, malignant tumour which had invaded the dura mater and the veins connecting the two cavernous sinuses. In several recorded cases where death occurred from either primary or secondary hæmorrhage an identical condition of affairs was found. We cannot always expect to find cysts or slow-growing adenomas, which are, of course, the most favourable lesions to deal with. Dr. Harris's patient was much relieved for a few weeks by a decompression operation performed by Mr. Graham, by a modification of the Killian-Hirsch method, but did not survive more than three days after removal of a considerable piece of the tumour two months later. In this case also the post-mortem examination disclosed a large malignant tumour extending up to and involving the floor of the third ventricle; the major part of the tumour, as in the speaker's case, being above the floor of the diaphragma sellæ.

He had recently looked up the operation mortality in the first hundred records he had happened to come across of cases of surgical interference *by the nasal route.* This number, recorded by twenty-nine different operators, by no means included all the records of the published operative results to date, but was sufficiently large and instructive for the purpose in view. The total operation mortality in these hundred cases was twenty-four. Of forty patients operated on by the superior nasal route — i.e., either by Schloffer's original rhinotomic method or by mitigated modifications of the same—fifteen had died as the immediate result of surgical interference, an operation mortality of about 37 per cent. Of thirty-one patients operated on by the lower nasal route—the Rouge-Halstead method—four only had died, a mortality of about 13 per cent.; whilst of twenty-nine cases operated on by the endonasal method of Hirsch four also had died, which worked out at between 13 per cent. and 14 per cent. If we took the immediate operative results of the two surgeons who had done the largest number of these operations, we found that Cushing had four deaths out of twenty-six cases operated on by the Rouge-Halstead method, and Hirsch had three deaths out of twenty-six cases operated on endonasally by the Killian-Hirsch method—the deaths in these two latter lists being due rather to the unsuitability of the cases for operative interference as found at the post-mortem examination rather than to errors in operative technique.

He would not go into statistics of temporary or of prolonged improvement brought about by per-nasal operations, but a perusal of the monograph of Cushing and of the long paper by Hirsch in Frankel's *Archiv für Laryngologie*[1] would show that very substantial amelioration of some symptoms was obtained by operation in a considerable number of these unfortunate patients.

He, in common probably with most present, cherished no illusion that pituitary surgery by the nasal or any other route was likely to prove a very specially inviting field for operative aggressiveness. Anyone who thought otherwise would do well to study carefully the convincing paper by their President of that evening (Dr. Tooth)[2] on 500 cases of brain tumour in which the disastrous results, in most cases, of any operative measures beyond mere decompression were clearly brought out. Rhinologists here had not appeared keen to embark on this recent extension of nasal surgery, but there would, he thought, be no difficulty in inducing some of them to do their best to oblige their neurological confrères, provided the latter could make a suitable case selection.

---

[1] *Archiv f. Laryngol.*, Berl., 1912, xxvi, pp. 529-686.

[2] *Proc. Roy. Soc. Med.* (Neurol. Sect.), pp. 1-18.

Dr. Hill demonstrated, by the aid of large, coloured wall diagrams, the most extensively used nasal routes of approach to the pituitary fossa, and exhibited the following tabular scheme, which includes nearly all the operations practised or suggested.

A star (*) indicates the methods which will appeal to general surgeons and a double star (**) those likely to be favoured by rhinologists.

Central Nasal—i.e., Septal Routes.

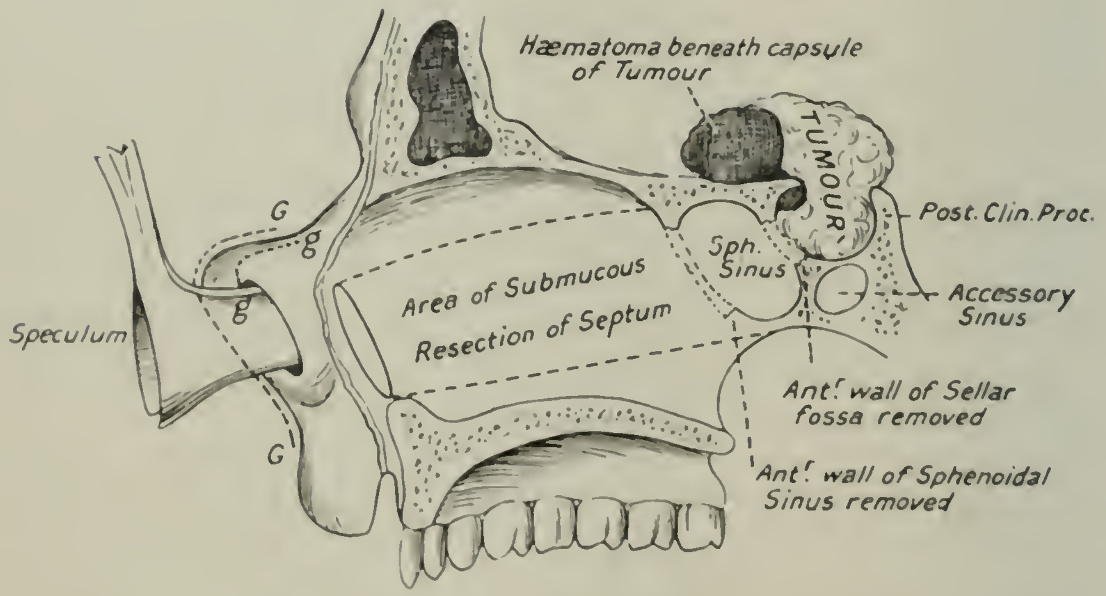

Hæmatoma beneath capsule of Tumour
TUMOUR
Post. Clin. Proc.
G
g
Sph. Sinus
Accessory Sinus
Area of Submucous Resection of Septum
Speculum
g
Antr. wall of Sellar fossa removed
G
Antr. wall of Sphenoidal Sinus removed

Fig. 1.

Diagram by Dr. Hill of the endonasal decompression operation (Killian-Hirsch method) performed by him on Dr. Leonard Williams's patient. Post mortem a post-operative hæmatoma was found and also an accessory air sinus in the basi-sphenoid. The Killian speculum should have blades 9 cm. long in order to reach the sphenoidal sinuses. The alternative auxillary incisions used by Mr. Graham are indicated by dotted lines at *G G* and *g g*: the latter, in cases of narrow noses, can be extended upwards slightly to the left of the mid-line as far as the root of the nose, the nasal bone divided, and half the external nose turned to the left as an osteoplastic flap (Linhart's Rhinotomy).

A.—*Endonasal Method.*

** (1) The Killian-Hirsch method: commencing with Killian's resection of the septum, followed by resection of the anterior walls and septum of the sphenoidal sinuses + removal of the floor of the sella turcica (Hirsch, Hill).

B.—*External Rhinotomic Methods.*

** (2) Enlargement of one anterior narial opening by an anterior incision forwards and upwards, followed by the Killian-Hirsch operation (Graham).

** (3) Vertical fissure of the tip of nose and columella, followed by the Killian-Hirsch operation (Graham).

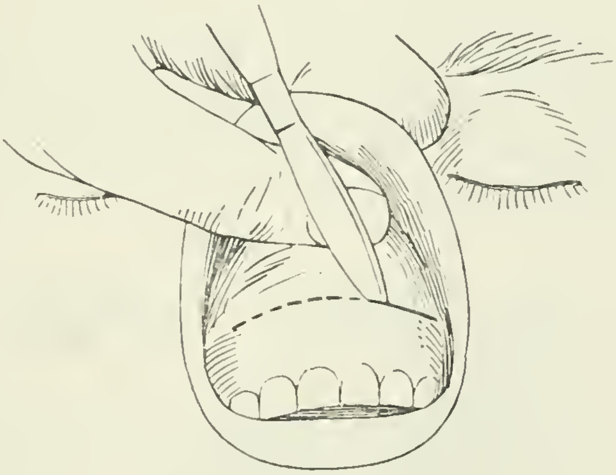


Fig. 2.

Initial sublabial incision in the Rouge-Halstead operation (after Halstead).

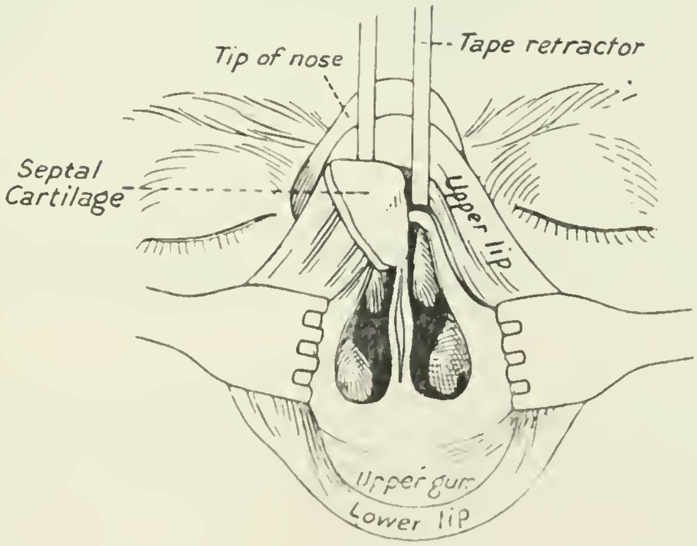


Fig. 3.

Rouge's upward displacement of the nose preparatory to submucous septal resection, &c. (after Halstead).

(4) Lariche's external transverse naso-labial incision with upward displacement of the cartilaginous external nose, followed by septal resection, &c. (Kanavel, Mixter).

* (5) Sublabial oral incision (a miniature Rouge operation) with upward displacement of the cartilaginous external nose, followed by submucous resection of septum, &c. (suggested by Löwe but first adopted by Halstead and later and Cushing).

(6) Vertical central fissure of the whole of the external nose with temporary separation of osteoplastic flaps, followed by submucous septal resection, &c. (Löwe).

(7) Kocher limits the fissure to the *bony* external nose.

* (8) Bruns's lateral osteoplastic displacement of the external nose to the right, followed by septal resection, &c. (Eiselsberg, Stumme, Thorburn,'&c.)

* (9) Ollier's inverted U-shaped incision with downward vertical osteoplastic displacement of the external nose, followed by septal resection, &c. (Hochenegg, Kocher, &c.).

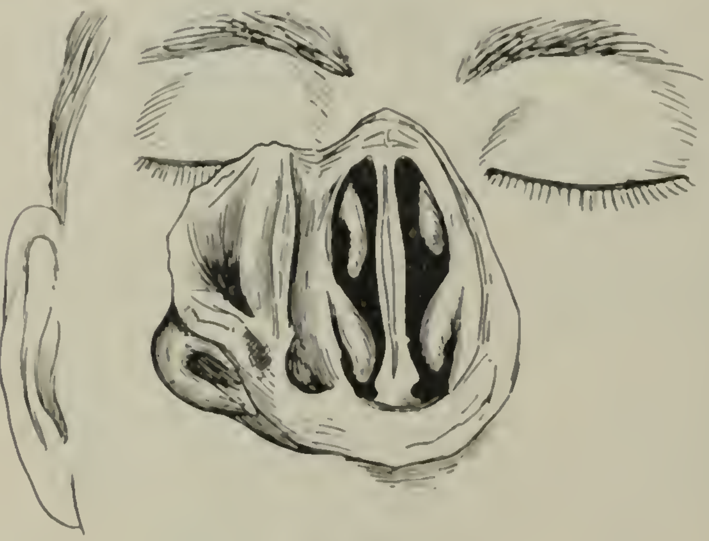


FIG. 4.

Bruns's lateral osteoplastic displacement of the external nose. This probably affords the *shortest* septal route to the sellar floor (after Bosworth).

(10) Allandale's operation, which includes Rouge's sublabial elevation of nose + separation of the maxillæ, osseous palate, &c. (Koenig, Löwe).

(11) Bucco-palato-septal route—partial resection of the hard palate and of posterior part of septum, &c., through the mouth (Koenig, Löwe, Ballance).

In all of these septal routes one or both middle turbinals, and even the inferior turbinals, can be removed either at the time of operation or a few days beforehand. The lateral compression of the lateral ethmoidal regions by means of a nasal dilator through the muco-membranous septal tunnel, as carried out by Kocher and by Cushing is, however, all that is really necessary.

LATERAL NASAL—I.E., ETHMOIDAL ROUTES.

A.—*Endonasal Method.*

(12) Hajek's unilateral ethmoidal exenteration, followed by resection of postero-superior region of vomer + removal of the anterior walls and septum of sphenoidal sinuses, &c. (Hirsch, West).

B.—*External Rhinotomic Methods.*

(13) Chiari's operation carried out by an incision (allied to Langenbeck's and Moure's) between the side of the bony nose and orbit, with removal of the nasal process of the maxilla, followed by ethmoidal exenteration, &c., as in Hirsch's ethmoidal method described above (Chiari).

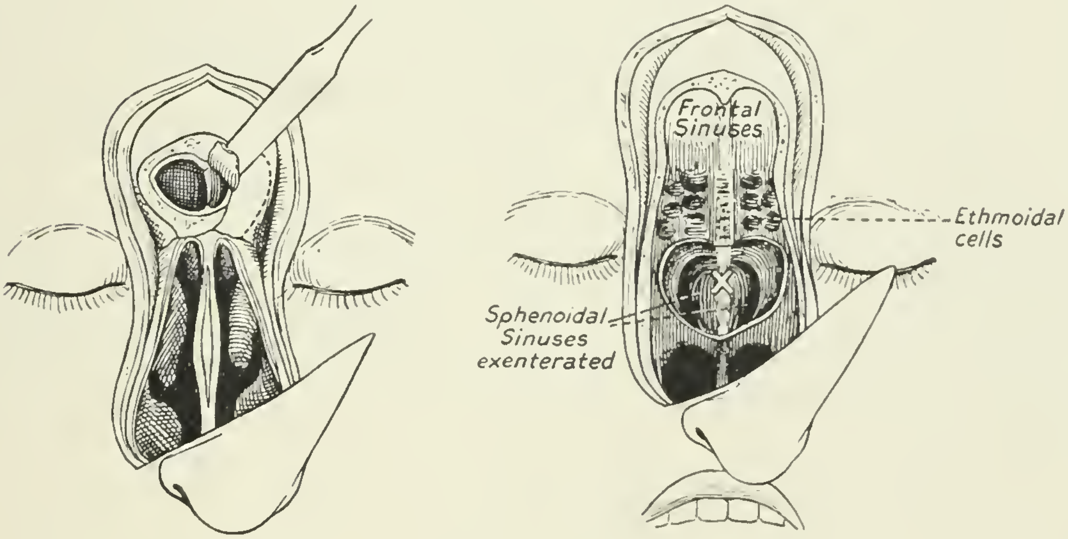


FIG. 5. FIG. 6.

Figs. 5 and 6.—Proust's semi-diagrammatic illustrations (slightly modified) of two stages of Schloffer's operation. The cross (**X**) in fig. 6 shows the centre of the sellar floor, the removal of which is the next stage.

(14) Moure's external rhinotomy, followed by ethmoidal and sphenoidal exenteration, &c., as above.

(15) Watson-Williams's osteoplastic fronto-ethmoidal operation + sphenoidal exenteration, &c.

These mainly ethmoidal routes are probably destined to become obsolete.

EXTERNAL RHINOTOMIES WITH COMBINED SEPTAL AND ETHMOIDAL RESECTIONS.

(16) Schloffer's operation commenced with downward displacement of the external nose by Ollier's incision with a frontal prolongation; the upper part of the septum was removed, and free exenteration of the

frontal, ethmoidal and sphenoidal sinuses on each side carried out, even the os planum being removed. Hochenegg used Bruns's incision, and made a temporary osteoplastic flap to expose the frontal sinus. Eiselsberg and others adopted this latter method for a time.

(17) Dialti resected the same areas as Schloffer, but used a Y-shaped incision, exposing the frontal sinuses and fissuring the whole of the external nose in the mid-line vertically.

(18) Kocher formerly fissured only the bony part of the external nose, using a central vertical incision and a transverse one at each end and gaining access by turning aside the lateral osteoplastic flaps; the subsequent exenterations, however, were nearly as extensive as those of Schloffer and Dialti.

(19) The above unnecessarily extensive and severe procedures gradually gave place to a *mitigated* Schloffer type of operation in which the external nose was displaced either by Ollier's or by Bruns's method and partial ethmoidal exenteration was carried out on one side only (the frontal sinuses not being touched), the upper part of the septum was resected and the sphenoidal sinuses opened up and their septum removed, &c.

It is becoming more and more obvious that there is no necessity to add to the difficulty and danger by opening the ethmoidal cells at all, as removal of one or both of the middle turbinals, or even compression alone of the lateral ethmoidal regions, gives sufficient room if one of the submucous septal routes is employed. (*See* Septal Route operations above).

OTHER ROUTES.

(20) Suprahyoid lateral pharyngotomy and opening up the floor of the sphenoidal sinuses by way of the nasopharynx.

*(21) Lateral Subtemporal Craniotomy (Horsley, Cushing, &c.).

*(22) Anterior Frontal Craniotomy (Krause, McArthur, &c.).

The craniotomic operations of Horsley and Krause have been usefully employed in some instances for decompression and for partial removal of large tumours. Cushing has operated by the sub-temporal route in some cases where a previous operation by the naso-sphenoidal route had proved insufficient on account of the size of the tumour, which had extended far beyond the limits of the pituitary diaphragm and involved the infundibulum and floor of the third ventricle, &c.

The complete set of nasal instruments, either employed or ready at hand, in the two cases operated on at St. Mary's Hospital were exhibited.[1]

---

[1] See *Proc. Roy. Soc. Med.*, 1913, vi (Laryngol. Sect.), p. 61 and p. 103.

Mr. GRAHAM said all he had to remark was that, having escaped the dangers which Dr. Hill enumerated, it was quite possible to eviscerate the pituitary fossa. But if the growth had got beyond the fossa operation was not of any great use beyond decompression. If it were possible to make the confident diagnosis of growths restricted to the fossa, there was no reason why they should not be removed completely, particularly in the case of adenomata or cysts.

Dr. LANGDON BROWN showed photographs and skiagrams from a case that he had had under observation at intervals for the last seven years. A woman, aged about 40, was admitted for severe anæmia of long standing on June 12, 1907. The history was that the anæmia had got worse for the last month, and that it had been associated with pain and vomiting after food. Melæna was found to be present and the blood count showed the changes of secondary anæmia. She improved rapidly under treatment directed towards duodenal ulcer. Many other points of interest in the case were noted, however. She was short, with a heavy face, and the fingers were stumpy. The skin all over the body was covered with coarse brown freckles, which she said she had had all her life. The right pupil did not react to light or accommodation, and its pupil was larger than on the left side. There was optic atrophy in this eye. There was also external strabismus on this side. The left disk was simply pale. Mr. Brewerton kindly examined her later, and in addition to confirming the above reported the vision to be R. $\frac{6}{24}$, L. $\frac{6}{9}$, not improved by glasses. The right field was contracted for white and markedly contracted for red — the left field was normal. There was a cystic enlargement of the thyroid which had been noted for four years. She had not menstruated for several years. The pubic hair was present though scanty. There was nothing abnormal to be made out in the heart beyond hæmic murmurs, which cleared up as the anæmia improved. When convalescent the blood-pressure was 150 mm. The urine was natural. The left knee-jerk could not be obtained. A skiagram taken of the skull was inconclusive. The bones of the hand showed outgrowths similar to osteo-arthritis. She was seen at intervals up to two years ago. She remained fairly well except for some anæmia. She sweated easily and profusely. The catamenia returned two years ago and she ceased to visit the hospital.

On January 20, 1913, she was readmitted with a recurrence of profound anæmia. She said that she began to get anæmic again at the beginning of the year, and that she often vomited immediately after food without much pain. Melæna was observed. There were only 2 million red corpuscles. Instead of the external strabismus she showed diminished upward movements of the right eye. Otherwise the signs were as before, with the addition of a bony thickening of the sternal end of the second left rib, which was of interest in view of the spontaneous fracture in that position in Dr. Turney's case. She again improved under treatment, and when convalescent her tolerance for dextrose was tested. She was given on different mornings 160, then 224, and finally 256 grm. of dextrose, but no trace of a reducing substance was ever found in the urine. Her blood-pressure was now 135 mm. Mr. Pisani kindly examined her eyes and considered that now the left disk also showed signs of atrophy. A skiagram by Dr. Finzi showed the pituitary fossa to be enlarged, and the clinoid processes more widely separated than normal. Setting aside the secondary anæmia from gastric or duodenal hæmorrhage, it seems that though she may have passed through an acromegalic stage her condition is best described now as one of hypopituitarism. The amenorrhœa and the increased tolerance for sugar in particular point to this. There is not bitemporal hemianopsia, but the optic atrophy and the partial interference of the third nerve on the right side might be due to bony pressure in the neighbourhood of the sella turcica. The cystic enlargement of the thyroid is probably compensatory. She was hungry during convalescence, but not more so than anyone might be who had been on a restricted diet. She was not drowsy and there was no excessive obesity.

It might be urged that she was simply a case of myxœdema in which increased sugar tolerance is the rule and optic atrophy not uncommon. But her appearance was not typical and her mental state certainly did not suggest it. And a cystic thyroid is not ordinarily seen in myxœdema. Moreover, although she was given thyroid extract with some improvement, the improvement was not anything like that ordinarily seen in myxœdema.

Mr. Richardson Cross (Bristol) said it had not been his intention to make a set speech on this important disease, but it happened that he had clinically met with, first, a good many cases of more or less typical acromegaly, and, secondly, a large group of cases of bitemporal hemianopsia with symptoms which were associated by ophthalmic surgeons with disease of the pituitary body, in which no signs, or only indefinite ones, of acromegaly were present. When he was a student nothing was known about these ductless glands—the suprarenal, the thymus, the thyroid, the pituitary body, the pineal gland. It was now considered that they had important associations with one another, and with the genital organs. It seemed that the different parts of the body were not only connected by the nervous system, but also by the blood and lymph system, and probably every cell had its share in keeping the blood and lymph healthy; but the blood glands were of special importance in the general metabolism. He believed removal (partial) of the hypophysis had an effect upon all the other blood glands of the body, and sudden death might result from instantaneous removal of the suprarenal or pituitary bodies. It seemed probable that the posterior lobe of the pituitary body was closely allied in function to the suprarenal body, and had some important control over the vascular system. The anterior lobe seemed essential to the growth of the skeleton, and of the connective tissues; diminished action in the anterior lobe caused infantilism; excessive action of the anterior lobe of the pituitary body caused gigantism in the youth, and in the adult acromegaly. It seemed to him curious how seldom brain tumours gave any symptoms of either acromegaly or infantilism, but the pituitary body is well protected. The physiologists would probably show the connexion to be a close one between the blood glands and the uterus, ovaries, &c.

With regard to the clinical aspect, he showed a case some years ago, at the Neurological Society,[1] of typical acromegaly in which there had been marked defects in the visual fields. There was a striking improvement under thyroid extract, and clearing up of the visual field; this and pituitary extract certainly did much good in these cases. The man referred to was kept continually under observation, and though still a "giant" was able to resume his work and games. His vision markedly improved, but he died of tubercle of the lung. The appearance of the optic nerve in acromegaly was a typical one, not quite like a condition of sclerosis or atrophy; it was a pale yellow, ivory-coloured nerve.

He had seen one case in which there was recurring binocular neuritis. The patient used to get attacks pointing to active cerebral tumour—double optic neuritis with great impairment of vision, sickness, headache, &c., and at one time operation seemed called for, but the condition cleared up without it. She died of another cause, having had for two years no active symptoms, but there remained post-neuritic atrophy of both nerves, and the permanent condition of bitemporal hemianopsia. Dr. Taylor saw this patient with him, and also the following: A medical man who had not so much the symptoms of acromegaly as brain discomfort, and typical hemianopsia suggestive of pituitary mischief. The question of operation had been raised, but he was dissuaded therefrom. This patient was seen recently; he was feeling well, one of the fields of vision had enormously improved, and he had been game shooting. He had been taking thyroid and pituitary extract for some time. There was a prospect of a much earlier diagnosis in these cases, and therefore of more effective treatment. He hoped very few of them would need operation, though no doubt this would be advisable in some cases, especially where a definite tumour was present. It seemed curious how seldom acromegaly was associated with symptoms of intracranial pressure, as was the case in the second patient just mentioned; he believed that optic neuritis very seldom accompanied acromegaly.

---

[1] *Brain*, 1902, xxv, p. 311*a*.

Dr. GRAINGER STEWART showed a specimen of pituitary tumour from a patient whose first symptoms commenced in 1903 with pain in the upper division of the left fifth nerve, followed by a gradual onset of paralysis of the left third nerve. The pain was paroxysmal and it was thought it might be due to syphilitic meningitis or tumour. He was radiographed, but nothing abnormal was seen. He was treated with anti-syphilitic remedies, but without any benefit. He was next seen twelve months afterwards. At that time he was completely blind in the left eye and had temporal hemianopsia in the right. In December, 1904, the patient, who was under the care of Sir William Gowers, was operated on by Sir Victor Horsley, who removed the bone on the left side of the head in the frontal region, and exposed the tumour by lifting up the left frontal lobe. The left side was chosen because the cranial nerve symptoms were left-sided, and the presumption was that the tumour would extend more to the left side than to the right. The tumour was visible at the operation, and Sir Victor Horsley scraped some of it away with a spoon. The patient recovered perfectly naturally from the operation, but the whole tumour was not removed. Unfortunately there was practically no alleviation of the symptoms. As the pain along the distribution of the fifth nerve continued, another operation was done six months later, in 1905. Sir Victor Horsley this time removed the left Gasserian ganglion. The pain then stopped and the patient remained practically in the same condition as before the operation, with the exception of being free from pain. About three months after the operation he suddenly became hemiplegic on the right side with aphasia. For seven years he remained alive, and though he completely lost his vision, he recovered his speech after he had been aphasic for two years. It was not until the last three or four years that he began to develop glandular symptoms ; he became very adipose, his complexion became pale and waxy, his sexual organs regressed, and his hair began to come out. This case resembled the one which was shown at the last meeting (*see* p. xx) : A man, aged 51, who for many years had had adiposity and sexual regression typical of deficient action of the posterior lobe of the pituitary gland. He wished to mention the case, shown last week, which Mr. Rutson James had sent to him, and which corresponded to the Lorain type. The patient, a girl, aged 20, who looked like a child of 14, had an infantile uterus, but some pubic and axillary hair. Her symptoms, headache, vomiting, &c., were of a year's duration. At first they recurred every month, so that her mother thought they were connected with menstruation. Later she developed fits and signs of general intracranial pressure, with failure of vision. She was an example of affection of the pituitary body, in which there was true infantilism ; her sexual organs were infantile, but there was no adiposity or increase of sugar tolerance. She gave a very well-marked thermic reaction on injecting extract of anterior lobe of the pituitary. Therefore he suggested she was an example of hypopituitarism, affecting chiefly the anterior lobe. If the thermic test was of value, she was suffering from deficiency of that lobe.

With regard to the treatment of pituitary cases in general, there was no doubt that the majority of these patients would live for years without operation, and the only object of operative interference seemed to be to save the sight. If that could be satisfactorily carried out by nasal operation, he believed that much of the difficulty which at present confronted the profession would be removed. It was now possible to diagnose these cases very much earlier than when one had to rely upon the development of ophthalmic symptoms. That being so, he did not see why in a short time it should not be possible to treat the glandular manifestations of such cases by extracts of either the anterior or the posterior lobe of the pituitary body, according to the results of the different tests which were applicable to such cases, and by timely operation by the nasal route to retard or prevent the loss of vision. Careful examination should permit of appropriate post-operative glandular treatment to compensate for the disturbance or destruction of the gland consequent upon operation.

Dr. THEODORE THOMPSON said he wished to draw attention to certain radiographic appearances in cases of pituitary enlargement. The radiograms were all taken by Dr. Gilbert Scott, Radiographer to the London Hospital. The taking of these radiograms requires great care, and a special apparatus has been devised by Dr. Scott to ensure the accurate apposition of the orbital plates and a clear view of the sella turcica. In the normal sella turcica the appearances are fairly constant (fig. 1). The cavity is roughly circular in outline in the radiogram. The diameter of the circle is about 1·2 cm. and the posterior clinoid process is separated from the anterior clinoid process by about 1 cm. The posterior clinoid process may be sharply pointed, or have a blunted or bulbous end. The base of the fossa is formed by dense bone, which throws a strong shadow. In pituitary enlargement, the appearances differ considerably in various cases. He showed two

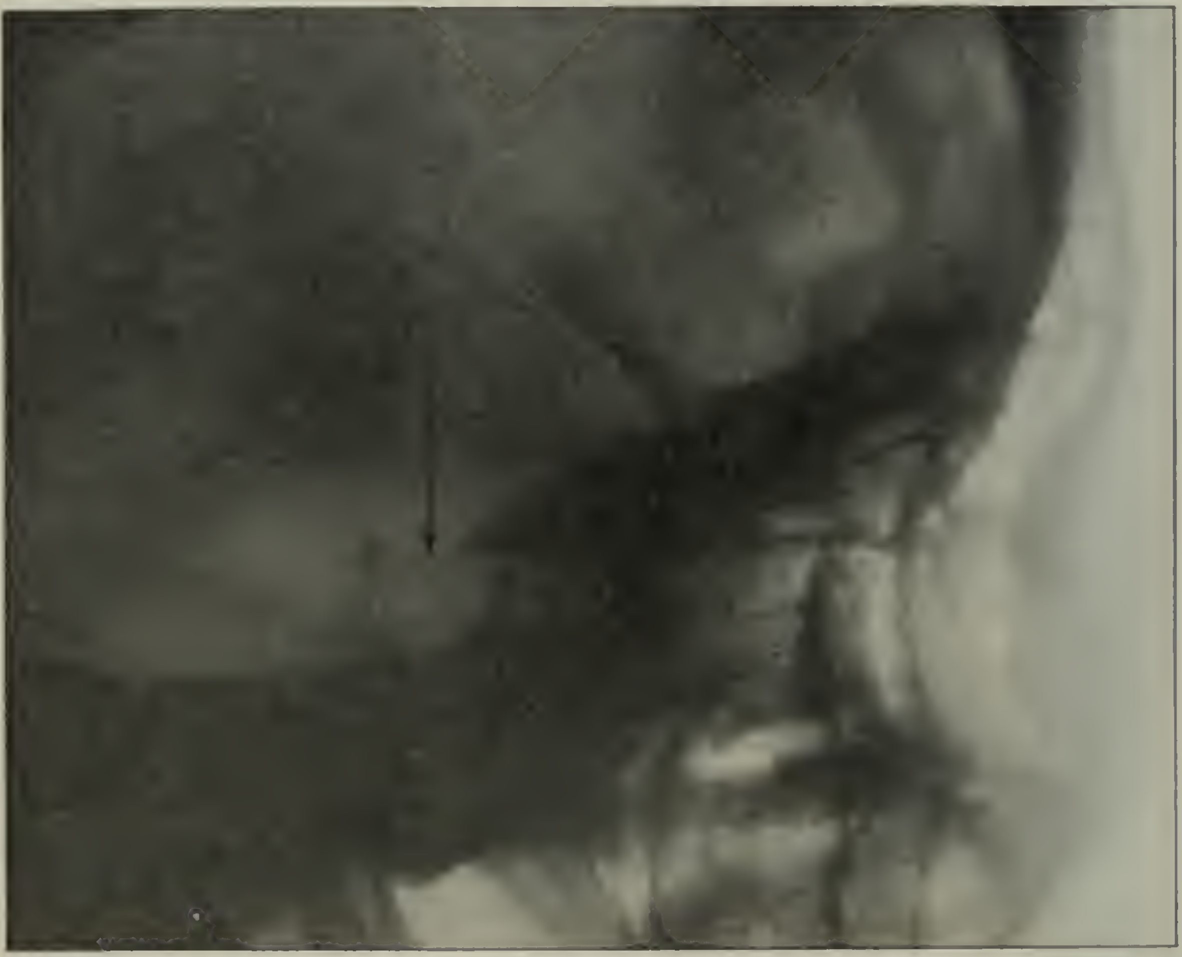


FIG. 1.

Normal sella turcica.

cases of pituitary tumour; in the one there is bitemporal hemianopia but no sign of acromegaly or infantilism; in the other there is typical acromegaly without any limitation in the fields of vision. In the case of bitemporal hemianopia (fig. 2), the pituitary fossa is shallow and greatly enlarged, and the striking feature is the separation of the anterior and posterior clinoid processes, which now are separated to a distance of 2·3 cm. In this case the growth has evidently enlarged upwards and involved the optic chiasma. In the case of acromegaly without ocular symptoms, the appearances (fig. 3) are very different. There is marked enlargement of the sella turcica in a downward direction and the dense bone, which in normal cases forms the floor of the cavity, is eroded. The cavity is now about 3 cm. in diameter, the enlargement having taken place chiefly in a downward and forward direction. The clinoid processes are not, however, widely separated, being only distant 1·5 cm. instead of the normal 1 cm. In this case there is clearly an enlargement of the anterior lobe of

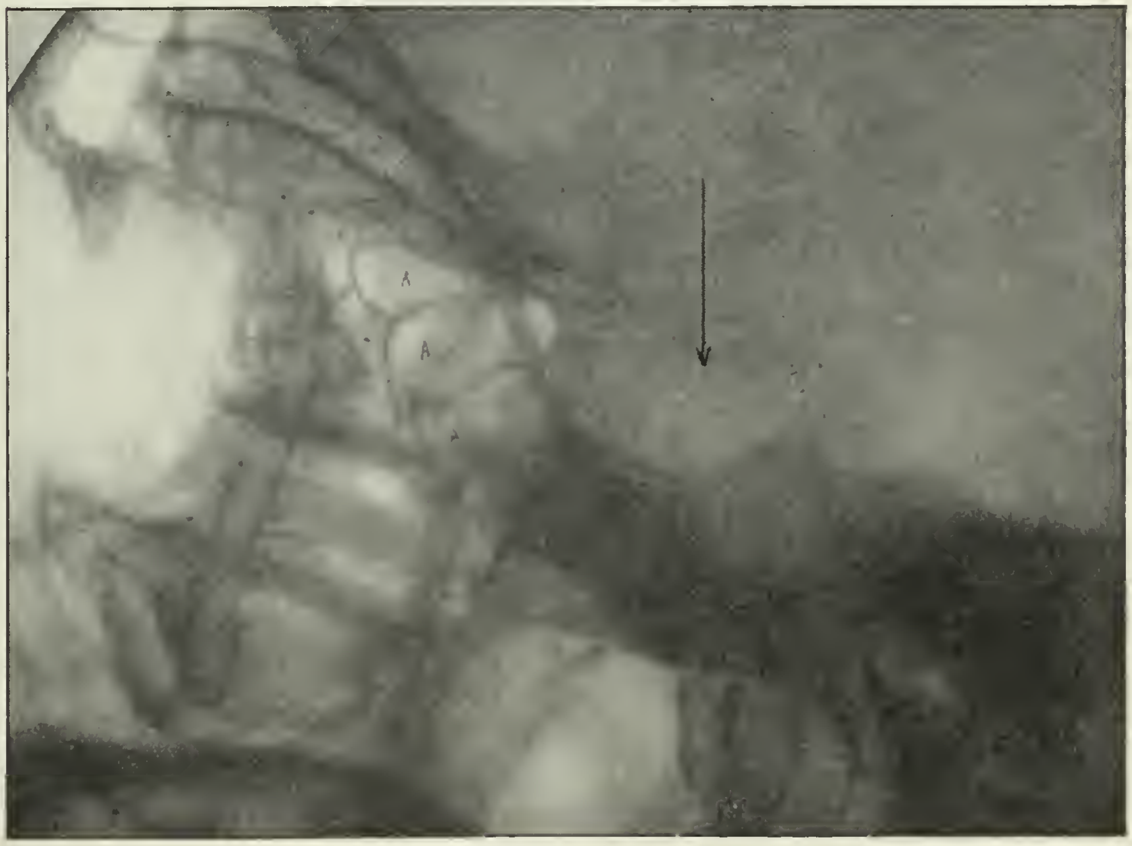


FIG. 2.

Pituitary tumour. Symptoms: Field of view diminished. Diagnosis from skiagram.

the pituitary gland, which has not spread upward to any extent and has not involved the optic chiasma. This relation between the radiographic appearances and the clinical symptoms of pituitary disease is important, but the relationship will not be a constant one, for an enlargement of the anterior lobe may spread upwards and involve the optic chiasma and thus give the combined picture of acromegaly with ocular symptoms.

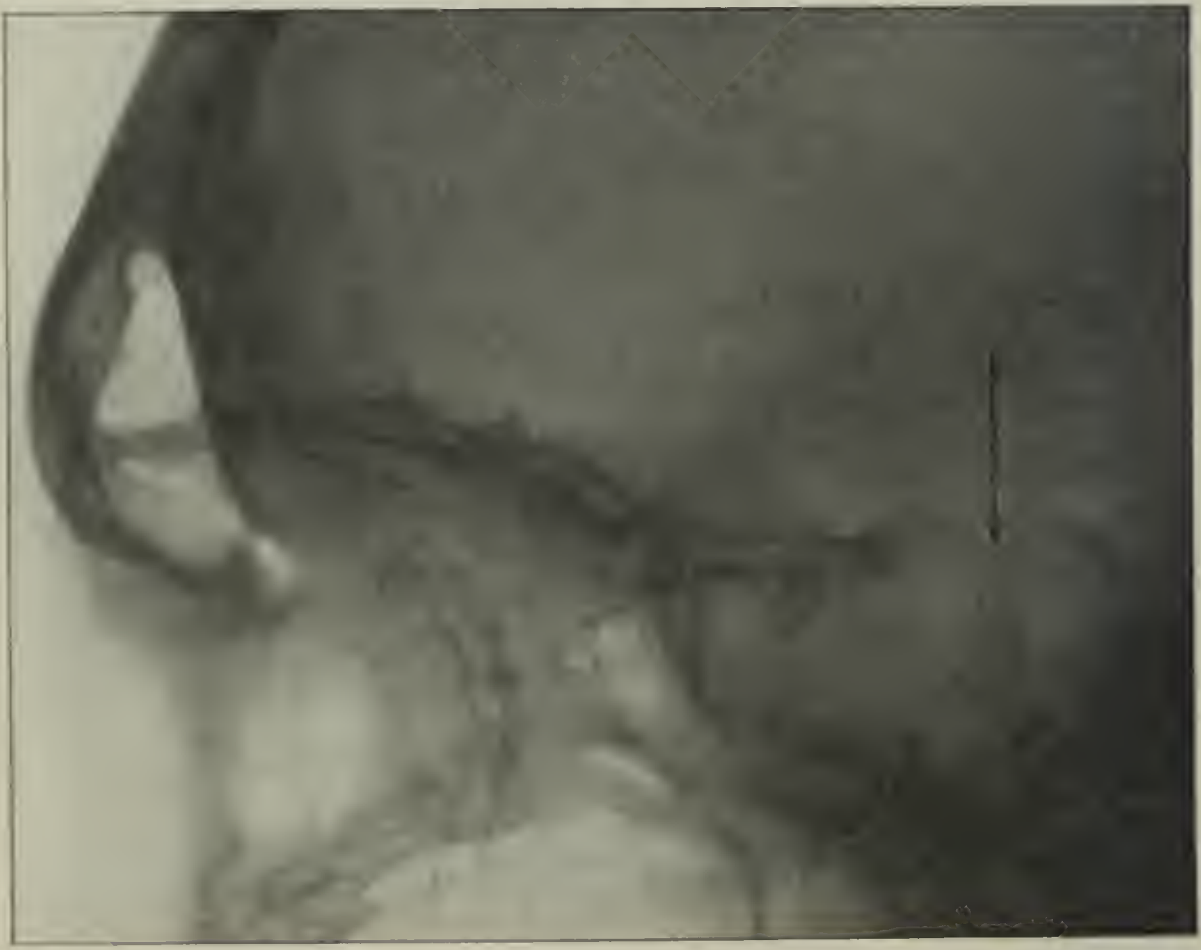


FIG. 3.

Acromegaly. Symptoms: Typical in appearance but *no* ocular trouble.

It would, however, be interesting by examination of a large number of cases to determine whether any correlation exists between the degree of involvement of the ocular symptoms and the separation of the clinoid processes.

PROCEEDINGS

OF THE

ROYAL SOCIETY OF MEDICINE

VOLUME THE SIXTH

COMPRISING THE REPORT OF THE PROCEEDINGS FOR THE
SESSION 1912-13

OBSTETRICAL AND GYNÆCOLOGICAL SECTION

LONDON
LONGMANS, GREEN & CO., PATERNOSTER ROW
1913

Obstetrical and Gynæcological Section.

OFFICERS FOR THE SESSION 1912-13.

President—

Amand Routh, M.D.

Past Presidents—

Sir Francis H. Champneys, Bt., M.D.
Sir J. Halliday Croom, M.D.
Alban Doran, F.R.C.S.
G. E. Herman, M.B.
Sir William J. Smyly, M.D.
W. D. Spanton, F.R.C.S.
H. Macnaughton-Jones, M.D.

Vice-Presidents—

G. F. Blacker, M.D.
W. J. Gow, M.D.
F. W. N. Haultain, M.D.
Arnold W. W. Lea, M.D.
A. H. N. Lewers, M.D.
Mrs. Scharlieb, M.D.
Herbert R. Spencer, M.D.
J. H. Swanton, M.D.
J. H. Targett, M.S.

Hon. Secretaries—

W. W. H. Tate, M.D.
T. W. Eden, M.D.

Other Members of Council—

H. Russell Andrews, M.D.
W. Blair Bell, M.D.
Comyns Berkeley, M.D.
Victor Bonney, M.D.
Archibald Donald, M.D.
J. S. Fairbairn, M.B.
W. S. A. Griffith, M.D.
M. Handfield-Jones, M.D.
D. Berry Hart, M.D.
Henry Jellett, M.D.
Cuthbert Lockyer, M.D.
Christopher Martin, F.R.C.S.
R. D. Maxwell, M.D.
G. Bellingham Smith, F.R.C.S.
T. G. Stevens, M.D.
W. C. Swayne, M.D.
Mrs. Vaughan Sawyer, M.D.
Clifford White, M.D.

Representative on Library Committee—

C. Hubert Roberts, M.D.

Representative on Editorial Committee—

J. Phillips, M.D.

OBSTETRICAL AND GYNÆCOLOGICAL SECTION.

CONTENTS.

October 10, 1912.

By Henry Briggs, F.R.C.S. PAGE
(1) Hydatid Mole: a Test of its Relative Size 1
(2) Vaginal Adenomatous Polypus following Removal of Uterus and Appendages... 2
Hæmatocolpos, with Remarks on the Structure of the Vaginal Wall. By R. Drummond Maxwell, M.D. 3
Gelatinous Glandular Cysts of the Ovary, and the so-called Pseudomyxoma of the Peritoneum. By Thomas Wilson, M.D. 9

November 7, 1912.

Puerperal Eclampsia treated by Cæsarean Section. By R. Drummond Maxwell, M.D. 43
By H. Russell Andrews, M.D.
(1) Simultaneous Intra-uterine and Extra-uterine Pregnancy, with probable "Internal Wandering" of the Ovum 52
(2) A Small Ovarian Teratoma containing Brain and Well-formed Intestine 54
Urgent Cæsarean Section for Prolapse of the Cord in a Case of Contracted Pelvis. By C. Hubert Roberts, M.D. 56
A Short Paper on Le Fort's Operation (with an account of Eight Cases). By J. M. Wyatt, F.R.C.S. 59
Definition of Stillbirth 64

December 5, 1912.

Tubal Gestation: Rupture of a Gravid Tube into a Broad Ligament Cyst. By Herbert Williamson, M.D. 65
Rupture of a Hæmorrhagic Corpus Luteum into a Broad Ligament Cyst. By S. G. Luker, M.D.... 66
Tubal Hæmatoma. By H. Macnaughton-Jones, M.D. 67

PAGE
The Contraction Ring as a Cause of Dystocia, with a Description of a Specimen removed by Hysterectomy during Labour. By CLIFFORD WHITE, F.R.C.S. 70
Hydrocephalus complicated by Eclampsia, Fibroids, and a Contraction Ring. By Mrs. FLORENCE WILLEY, M.D. 86

January 2, 1913.

By CUTHBERT LOCKYER, F.R.C.S.
(1) Intra-uterine Nodule of Embryonic Origin resembling Osteochondroma 93
(2) Enormous Renal Cyst 97
By THOMAS WATTS EDEN, M.D.
(1) Endocervical Cancer with Distension of the Corpus Uteri and Extensive Thinning of its Walls 101
(2) Uterine Mole showing Low Implantation of the Ovum (Placenta Prævia) 104
Foreign Bodies removed from the Peritoneal Cavity. By H. RUSSELL ANDREWS, M.D. 105
Portion of Bone Knitting Needle, used to procure Abortion, removed by Operation from Abdominal Cavity; Development of a Pelvic Abscess, Fæcal Fistula, Septic Pyelonephritis, and General Septic Infection, with ultimate Recovery. By G. BLACKER, M.D. 107
Demonstration of Lighting of Operating Theatres. By H. MACNAUGHTON-JONES, M.D. 111
Adenomyoma in the Recto-uterine and Recto-vaginal Septa. By CUTHBERT LOCKYER, F.R.C.S.... 112

February 6, 1913.

By BECKWITH WHITEHOUSE, M.S.
(1) An Early Case of Sarcoma Uteri... 121
(2) Fibromyoma of the Uterus presenting Unusual Characters 124
By ARTHUR E. GILES, M.D.
(1) Diffuse Ovarian Fibroma with Central Cyst 127
(2) A Note on the Relative Frequency of Ovarian Tumours and Cysts based on the Analysis of 400 Ovariotomies 128
Tumour of Doubtful Nature removed from the Groin. By Mrs. SCHARLIEB, M.S. 129
Red Degeneration of Uterine Fibromyomata. By J. LORRAIN SMITH, M.D., and W. FLETCHER SHAW, M.D. 131
The Cause of Internal Rotation of the Fœtal Head. By JAMES YOUNG, M.D. ... 144

March 6, 1913.

A DISCUSSION ON VENTRIFIXATION.

The Indications for the Operation, with an Analysis of Seventy-seven Cases. By W. S. A. GRIFFITH, M.D. 167
The Technique of Ventrifixation of the Uterus and Allied Operations. By HENRY BRIGGS, F.R.C.S. 176

PAGE

The After-results of Operations for Uterine Displacements. By **Arthur E. Giles**, M.D. 192

Dr. **Herbert Spencer** (p. 202)—Dr. **Archibald Donald** (p. 203)—Dr. **Macnaughton-Jones** (p. 205)—Miss **Frances Ivens** (p. 206)—Dr. **Handfield-Jones** (p. 207)—Dr. **Arnold W. W. Lea** (p. 208)—Dr. **Tate** (p. 209)—Dr. **Hubert Roberts** (p. 210)—Mr. **Beckwith Whitehouse** (p. 211)—Dr. **Fairbairn** (p. 214)—Dr. **Farquhar Murray** (p. 215)—Dr. **Amand Routh** (p. 216)—Dr. **Griffith** (reply) (p. 216)—Dr. **Briggs** (reply) (p. 217)—Dr. **Arthur Giles** (reply) (p. 217)

April 3, 1913.

Two Cases of Fibromyoma of the Uterus undergoing Sarcomatous Degeneration. By **M. Handfield-Jones**, M.D. 219

Chorionepithelioma following Hydatidiform Mole and giving rise to Intraperitoneal Hæmorrhage from an Extension in the Right Mesosalpinx. By **Thomas Wilson**, M.D. 224

By **Frederick J. McCann**, F.R.C.S.

(1) A Primary Ovarian Pregnancy at the Fourth Month 229

(2) Perforation of the Fundus Uteri—Post Abortum 231

(3) A Large Pancreatic Cyst simulating an Ovarian Tumour 235

Extensive Rupture of the Utero-vaginal Junction with Escape of the Placenta into the Peritoneal Cavity. By **J. Bright Banister**, M.D. 237

The Arrangement and Distribution of the Nerves in certain Mammalian Ovaries. By **W. Abel**, M.D., and **A. Louise McIlroy**, M.D. 240

Chorionepithelioma of the Fallopian Tube, following Extra-uterine Gestation. By **V. Zachary Cope**, M.D., and **E. H. Kettle**, M.D. 247

May 1, 1913.

Solid Tumour of Ovary and Broad Ligament Cyst. By **C. E. Purslow**, M.D. ... 261

A Special Vaginal Clamp for use in Radical Hysterectomies (Wertheim). By **R. Drummond Maxwell**, M.D. 262

Bacterial Infection of the Fœtal Membranes from a Case of Hydrorrhœa Gravidarum. By **E. Napier Burnett**, M.D. 264

An Unusual Case of Rupture of the Uterus. By **Russell Andrews**, M.D. ... 272

Cyst of Ovary filled with Rounded Balls. By **Thomas Wilson**, M.D. 275

June 5, 1913.

Puerperal Venous Thrombosis after a Normal Labour, associated with Pyrexia, continuing for Five Months. By **Arnold Lea**, M.D. 281

Two Cases of Solid Pedunculated Papilloma of Ovary. By **Corrie Keep** ... 284

The Intra-abdominal Pressure in Pregnancy. By **R. H. Paramore**, F.R.C.S. ... 291

July 3, 1913.

PAGE
Calcified Ovarian Fibroma obstructing Labour. By H. S. SOUTTAR, M.Ch. ... 335
Suggestions for the Technique and Performance by a New Method of Wertheim's Abdominal Panhysterectomy. By CHARLES P. CHILDE, F.R.C.S. ... 339
Tubo-ovarian Cyst with Intracystic Carcinomatous Growth. By WALTER TATE, M.D. 346
Valedictory Presidential Address. By AMAND ROUTH, M.D. 348

Corrigendum.—On page 126. The President's remarks referred to the previous case, "An Early Case of Sarcoma Uteri," pp. 121-124.

The Council think it right to state that the Society does not hold itself in any way responsible for the statements made or the views put forward in the various papers.

JOHN BALE, SONS & DANIELSSON, LTD., 83-91, Great Titchfield Street, London, W.

Obstetrical and Gynæcological Section.

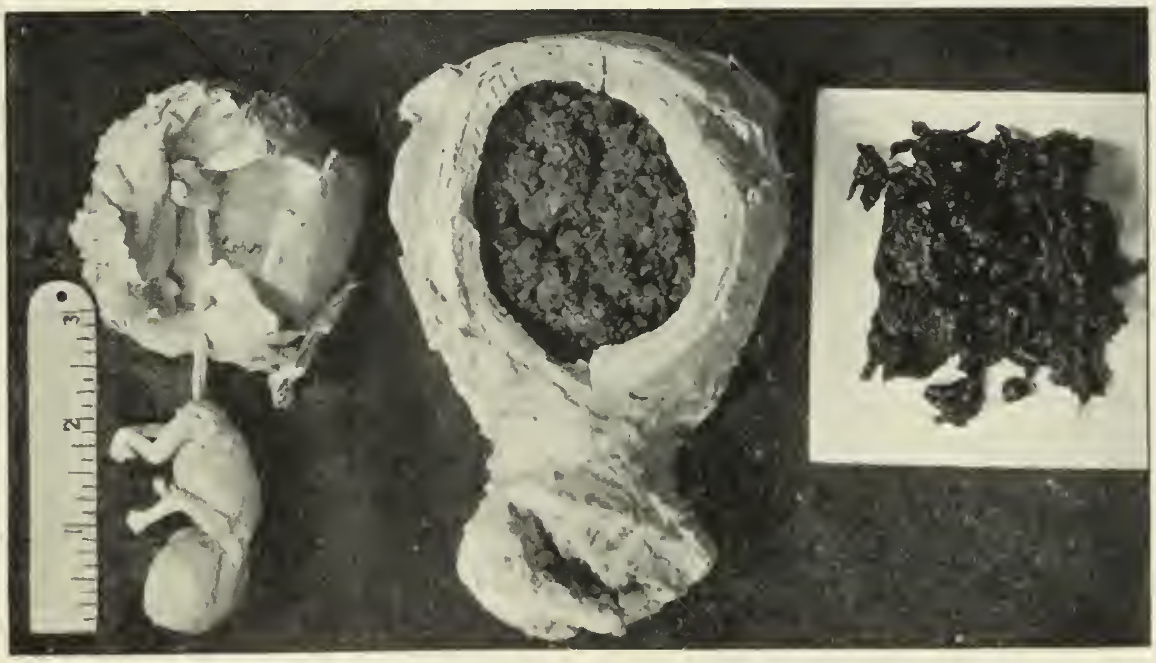
October 10, 1912.

Dr. Amand Routh, President of the Section, in the Chair.

Hydatid Mole: a Test of its Relative Size.

By Henry Briggs, F.R.C.S.

D. S., aged 41; twenty-two years married; eleven children and four abortions. The last abortion ten months ago; the last full-term labour four years ago.



A

The ovum under three months from B.

B

One-fourth of the spherical wall in front has been removed to display the interior of the uterus from which the ovum A was dislodged and the hydatid mole substituted, loosely placed and not packed; the hydatid mole does not fill the uterine cavity.

C

The clots originally mixed with the hydatid mole and separated after removal.

B and C together did not establish oversize of the uterus.

The molar pregnancy. Its history, obtained by Dr. Sibbald, of Bootle: The last menstrual period was delayed and the loss was excessive; it began on March 28 and ended on April 4, 1912; a dark-coloured blood loss commenced six weeks later and continued throughout. Its physical signs: On June 17, 1912, the uterus was examined by Dr. Briggs and reported to be a ten weeks' uterus with hæmorrhage; the hæmorrhage became severe.

Treatment by operation on July 2, 1912, dilatation of the cervix and digital removal of the hydatid mole and its envelope of decidua. The blood-clot was judged to have been *in utero* and to have determined the approximately normal size of an otherwise undersized uterus.

Vaginal Adenomatous Polypus following Removal of Uterus and Appendages.

By Henry Briggs, F.R.C.S.

An abdominal operation was carried out for a large ovarian abscess, 3½ in. in diameter, and a thick-walled, purulent tube, both on the left side; two small interstitial fibroids (1) 1½ in. and (2) ¾ in. in diameter, in the anterior wall of the uterus. The tube and ovary of the right side look normal, but there were patches of round-celled infiltration in the tubal wall.

Mrs. K., aged 43. Two children, the younger aged 17. History of excessive menstrual loss and peritonitis for years; acute pain and fever for several weeks before operation; the fever subsided before operation. Physical signs: The pelvis and lower abdomen were filled mainly by the large ovarian abscess and the thick-walled tube of the fixed fibroid uterus.

Operation (July 28, 1910): The abdominal radical operation with vaginal drainage.

After-progress: The patient recovered from the grave collapse of the operation and her former general good health was resumed. She reported at various times a blood-stained vaginal discharge which was always scanty and at intervals ceased, so that her doctor was not asked to see her until ten months after the operation, on May 16, 1911, when a friable polyp, 1¼ by 1½ in., was found hanging to the cicatrix in the vaginal roof by a slender, friable stalk which was easily detached by the finger.

After-history : Bleeding ceased, the patient's general health was excellent and no malignant or other induration was palpable. October 7, 1912 : The patient reported by her doctor to be in excellent health—a nineteen months' after-history.

Note.—The result of histological research was consistent with a tubal origin but both tubes had been apparently completely removed *per abdomen.* The greater half of the polyp was fibrinous.

Hæmatocolpos, with Remarks on the Structure of the Vaginal Wall.

By R. DRUMMOND MAXWELL, M.D.

THE case is of clinical interest inasmuch as it concerns a young woman, aged 19, an age at least three to four years in advance of the average period at which such cases present symptoms and are brought to hospital. In addition the patient had been married a few months and came primarily for treatment for dyspareunia. On examination the patient appeared to be a young woman of average intelligence, with all her secondary sex characters well developed. Examination by the abdomen failed to detect any hypogastric or other swelling. Inspection of the vulva showed the external genitalia to be normal. The introitus was, however, completely closed by a thick, fleshy septum, on the outer surface of which several strands of hymeneal tissue were stretched and lightly fused. There was no suspicion of bulging of this septum when pressure was applied to the hypogastrium. Although no tumour was detected abdominally, rectal examination revealed the existence of a large tense, cystic intrapelvic swelling whose lower pole appeared to be at least 1½ in. above the level of the septum. This swelling could be felt on rectal bimanual examination and was apparently of the size of a uterus at the twelfth week of gestation. The finger *per rectum*, carried forward (as though to investigate a rectocele), pressed outwards the posterior (lower) part of the septum but did not reveal the presence of any dilated vagina in contact with it.

Careful cross-examination of the patient failed to elicit the slightest evidence of periodic pain or menstrual molimina, her sole complaint was dyspareunia. It is of interest to add that though the daughter had urged her mother to mention the existence of some defect to the fiancé or at least to let her consult a doctor on the point, neither of these steps had been taken prior to marriage.

Treatment.—Since the physical signs suggested rather a hæmatometra than a hæmatocolpos, it was felt that a cystic swelling of this size would probably entail some disorganization of the tubes and there would be little advantage and indeed a good deal of risk of approaching the swelling from below without ascertaining definitely the condition of the upper genital tract. In these circumstances laparotomy was performed and a perfectly normal uterus and ovaries discovered. The supravaginal cervix—slightly dilated—disappeared into a tense cystic mass a good deal bigger than previous examination had led one to suspect. The abdomen was at once closed when it was recognized that the condition was retention of menses in the upper two-thirds of the vagina, the lower third not being canalized for about 1 in. With two fingers *per rectum* (carefully guarded by a pad sewn over the perineum to prevent infection of the wound) an incision was made with scissors, closely following the floor of the urethra into which a sound was inserted. After blunt dissection upwards for about 1 in. the floor of the wound showed as a transparent blackish membrane indicating the presence of retained menses. Before incising this, the now prominent lower end of the vagina was freed from the lateral paravaginal cellular tissue to enable a tube of it to be drawn down and stitched to the introitus. When enough had been freed to show a sausage-shaped swelling 1½ in. in length, it was incised circumferentially over its convexity, producing an aperture which would admit two fingers. Just over 1 pint of tarry fluid escaped, its viscosity being even more marked than usual. The circular edges of the tube were drawn well down to the vulva, beyond which they projected. The cervix could be felt with the finger-tip, its lips were slightly everted, but there was no appreciable dilatation of the canal. The vaginal tube was then stitched to the introitus by four catgut sutures (two antero-posterior and two lateral) and the union fortified by a continuous purse-string suture running all round the tube and securing it further to the introitus. A thin strip was removed from the anterior and posterior walls of the vaginal tube and forms the material for the microscopic report.

The hymeneal tissue showed the typical appearance fully described by Blair Bell in the *Proceedings* of March, 1911,[1] and in his "Principles of Gynæcology." No further reference will be made to it.

---

[1] *Proceedings*, 1911, iv, pp. 231-44.

Many interesting points are seen in studying the sections of the vaginal wall. Side by side as well as superposed on each other are recognized typical stratified epithelium and high columnar richly muciferous epithelium. This columnar epithelium has over some areas an unusual resting place. In some it lies actually on a layer, several cells deep, of what is obviously stratified epithelium springing from the Malpighian layer of the skin. In places this columnar epithelium is being shed, allowing stratified epithelium to approach the free surface. This process would appear to negative the view that the stratified epithelium spreads up from below and replaces the columnar epithelium, but suggests that the Malpighian layer of the skin first .produces a columnar muciferous layer and later, when its function is over, a stratified lining which persists. Since the Malpighian layer is the parent cell layer of all epidermal structures, this is not surprising, though one seldom sees two differentiated types of epithelial cells existing side by side in this intimate arrangement. I would suggest that the initial function of the columnar layer is to canalize the vagina by the pressure of its rich mucin secretion. Its walls would otherwise persist in apposition as a solid cord.

On further examination of the vaginal wall numerous invaginations of its lining are .seen ; at the bottom of these crypts the epithelium is high columnar and muciferous (as shown by the contents of the crypts) stained with muci-carmine in contrast to the many-layered stratified epithelium of the free surface. In places definite racemose glandular spaces are seen lined by columnar epithelium. Whether this gland formation is a natural process or owes itself in these sections to excessive intravaginal pressure is difficult to say, but it is clear that its persistence will account for later simple cystic change, or the adenomatous growth, either innocent or malignant, described by Bonney and Glendining in the *Proceedings* of October, 1910,[1] Blair Bell in 1911, and others.

The later history of the case was as follows: The vaginal tube united all round to the introitus and healed by first intention; twelve days after the operation the first menstrual loss occurred and lasted four days. No unusual phenomena accompanied the period and the amount lost appeared to be normal. The largest vaginal dilators were passed with ease, and as the vagina had assumed normal dimensions, patient was discharged three weeks after operation.

---

[1] *Proceedings*, 1911, iv, pp. 18-25.

DISCUSSION.

Dr. EDEN said that an interesting point in Dr. Maxwell's treatment of the case was the preliminary abdominal section, which was done in order to investigate the condition of the tubes. He knew that it was the practice of some gynæcologists to open the abdomen for this purpose in all cases of retained menstruation from congenital obstruction. He had recently seen Professor Amann, in Munich, carry out this treatment in a simple case of imperforate hymen, but the tubes were found to be normal. His own opinion was that the risk attending upon accumulation of blood in the tubes in these cases was a good deal exaggerated by the advocates of abdominal operation. He saw no reason why evacuation of the retained blood from below, when carried out under modern aseptic technique, should be followed by sepsis spreading upwards to the tubes. Such a result should be regarded as a surgical failure due to faulty methods. If, on the other hand, the case ran an aseptic course, there was good reason to suppose that the tubal blood would be gradually absorbed. Under such circumstances it was possible that the patency of the tubes might ultimately be restored, as sometimes occurred even after acute salpingitis.

Dr. BLACKER thought that Dr. Maxwell's action in opening the abdomen was a correct one. In a somewhat similar case which had been under his care a short time ago he had opened the abdomen, removed the tubes which were distended with blood, and had then proceeded to open the collection of blood in the vagina from below. He thought the risk of the breaking down of adhesions and of the entrance of blood into the peritoneal cavity from the distended tubes was sufficiently great to warrant such treatment in any case in which there was distinct evidence that the tubes were involved. If the tubes were much distended with blood they should certainly be removed. It was very rare to find any great amount of blood in the uterus even when there was a good deal in the tubes.

Dr. ANDREWS said that if he found on examination that a tube was dilated in a case of retention of menses, he would open the abdomen and remove the distended tube before letting out the blood from below. He had never had to do this in a case of hæmatocolpos due to the presence of a septum at the vaginal orifice, and did not expect to have to do so, but he had done so in cases of retention due to obstruction higher up in the vagina. He referred to a case reported by Dr. Lewers in the *Practitioner*,[1] in which the abdomen had to be opened four days after the evacuation of a hæmatocolpos, on account of grave symptoms of peritonitis, due to rupture of a hæmatosalpinx. In this case the septum was about 1½ in. above the orifice of the vagina. The patient recovered, but there was no doubt that her life had been in danger, and he could not agree with Dr. Eden that the presence of a hæmatosalpinx could be ignored in such a case.

---

[1] *Practitioner*, 1910, lxxxv, p. 137.

Dr. GRIFFITH exhibited sections of the septum and of the left lateral wall of the vagina, 1½ in. above the septum, from a girl aged 16, with hæmatocolpos. The vaginal wall was composed of connective tissue and of bundles of muscle-fibres covered by squamous epithelium without glands. He agreed with Dr. Maxwell that an exploratory laparotomy was necessary in his case to make sure of the diagnosis, but he differed entirely from those who said this was a necessary proceeding in the general run of cases. He had assisted and operated in these cases since he was house physician to Matthews Duncan in 1879, and had never seen any untoward results following the ordinary vulvar incision, even in the pre-antiseptic days, and he thought the risks were greatly over-rated. The contents of the vagina were always sterile, and the simple precautions now in common use appeared to remove any risk of sepsis, the most important complication.

Dr. HERBERT SPENCER said that in a case like Dr. Maxwell's, where the lower vaginal canal was absent, there was always some doubt about the nature of a tumour lying above it, and it was right to perform abdominal section instead of blindly cutting in from below. He had himself performed an exploratory operation in such a case, to find that the tumour was a pelvic kidney. He thought, also, when the tubes were distended with blood, as a result of stenosis in the vagina, they should be removed together with the uterus if the vagina was absent. He had seen a very severe attack of peritonitis occur in a case of hæmatocolpos with hæmatosalpinx in which the mother of the patient had refused to allow the removal of the tubes at the time the blood was evacuated from the vagina. In this case the tubes were easily recognizable before operation. In the ordinary case of stenosis at the hymen, in which there was no reason to suspect distension of the tubes, simple incision of the septum was all that was required.

Dr. BRIGGS said everyone present recognized that the treatment depended on the pathological conditions. The difficulties and dangers increased with the height of the obstruction. For example, a retention sac in the upper third of the vagina had resembled a displaced or cystic kidney. In these exceptional cases abdominal section asserted itself. Similarly loaded and disorganized Fallopian tubes very rarely occurred, and for them the light of abdominal section was the best introduction to either conservative or radical treatment. His own experience had proved that the Fallopian tubes rarely required removal; hence abdominal section was seldom needed. Simple incision and drainage of the imperforated sac, fortunately so frequently low down in the vagina, was the safe and satisfactory method of increasing repute.

The PRESIDENT (Dr. Amand Routh) said that one of the causes of the disasters which used to be so frequently observed in pre-antiseptic days in the treatment of cases of hæmatocolpos associated with hæmatometra and hæmatosalpinx was considered to be the tendency of the uterus to forcibly contract during the evacuation of the lower genital track, and to force its contents into the tube, and thence into the peritoneal cavity. This easily led to peritonitis if the vagina became infected. He wondered if those who were prepared to perform salpingectomy in cases of hæmatocolpos associated with hæmatosalpinx considered that septic peritonitis would be prevented if the vaginal and uterine contents became septic. The more radical operation of hysterectomy, as advocated in some cases by Dr. Herbert Spencer, might certainly prevent septic peritonitis; but this was a severe operation for a condition which, as Dr. Eden had said, did not usually require an abdominal operation in these days of antiseptic surgery.

Dr. MAXWELL, in reply, stated that he considered the preliminary exploratory laparotomy a sound proceeding for the following reasons: There was no absolute certainty that hæmatometra was not present, and that, if so, a very considerable degree of disorganization of the tubes was to be feared. He had been much impressed by the case referred to by Dr. Russell Andrews, where Dr. Lewers had been forced to open the abdomen several days after evacuation of a hæmatocolpos, for signs of peritonitis. In that case one of the tubes had ruptured and excited a marked peritoneal reaction in its vicinity. On those grounds he would hold to the principle that where tubal disorganization was suspected it would be safer to inspect directly the tubal changes as a preliminary to evacuation of the hæmatocolpos from below. The conditions found on exploratory laparotomy might necessitate treatment. Some of the less disorganized tubes would lend themselves readily to conservative treatment such as salpingostomy. On the other hand, he saw little use in preserving thin-walled, excessively dilated tubes associated with a hæmatometra. Probably such a case would be best treated by a subtotal hysterectomy and bilateral salpingectomy. Where a hæmatometra had to be reached and evacuated from below through an artificial canal subsequent stenosis of the upper part of the new tract was highly probable, with a re-accumulation of menses in the uterus, and the patient ought to be spared this risk. Another point not to be lost sight of was the question of sex. In departures from the normal of the genital tract, sex frequently remained problematical. This was not a theoretical objection, for several members of the Section had seen a case operated on by Dr. Russell Andrews where, with normal external genitalia of the female and secondary female characteristics well developed, the "uterus" was represented only by a fibro-muscular stump of tissue, into which ran peritoneal folds corresponding to the round ligaments. In association with this rudimentary "uterus" were two genital glands, whose structure both to the naked eye and to the microscope was testicular. There was no guarantee in the present case that the sex glands were ovarian, and surely it would at least be expedient to determine that the sex was female before endeavouring to construct an artificial vagina.

Gelatinous Glandular Cysts of the Ovary, and the so-called Pseudomyxoma of the Peritoneum.

By THOMAS WILSON, M.D.

THE multilocular proliferating glandular pseudomucinous cyst of the ovary varies exceedingly in its characters. Sometimes it appears as a simple non-adherent cyst, with thin, mucilaginous, easily flowing fluid contained in one single loculus, on whose inner surface bands, bridles, or imperfect septa bear witness to the essential multilocularity of the cyst. At the other end of the scale a firm, solid, gelatinous tumour made up of jelly in a multitude of small loculi with delicate transparent walls hovers on the brink of malignancy. Between these extremes is found every possible gradation.

The cysts that border on or pass into malignancy often give no indication of their peculiar nature until an operation for their removal is begun. Then surprise may be caused by the abdominal incision opening directly into a firm, gelatinous mass that fills more or less completely the whole of the peritoneal cavity. The material adheres closely to the peritoneum covering the abdominal wall, the intestines, and all the other organs; the omentum is usually invaded so as to form a broad, thick, hard plate; and collections may have made their way into the upper part of the abdomen, where they are found between the diaphragm and the upper surfaces of the liver, spleen and stomach.

When ovariotomy began to be practised frequently cases of this nature were soon met with, and were included under the term "colloid cancer" of the peritoneum or of the ovary. They were usually dealt with by partial evacuation of the jelly-like material and drainage, with disastrous results. Spencer Wells, in his third case, operated upon on November 5, 1858, gives a good description of the specimen removed—a gelatinous cyst with an immense number of imperfect alveoli from the size of a pea to that of a small apple; the alveoli were filled with a semi-opaque, jelly-like substance, in consistence from that of a firm jelly to that of white of egg.[1] Among the 114 cases in this volume two typical cases of pseudomyxoma of the peritoneum are found in Nos. 96 and 107 (pp. 244, 284); in both death followed upon operation.

---

[1] "Diseases of the Ovaries," by Spencer Wells, 1865, i.

In his book on "Diseases of the Ovaries," published in 1872, p. 55, Wells says:—

"The tendency of the cystic form of tumour to degenerate into that known as colloid cancer is very apparent. . . . The colloid cancer is a sort of intermediate form of disease, having intimate alliances and resemblances, on the one hand with the innocent single cysts, and on the other, often being intermingled and confused with the most rapidly spreading and malignant cancer growths."

In his "Tumours of the Ovary," &c., published in 1884, Doran says (p. 15):—

"True colloid changes produce the characteristic pale-orange jelly-like material that gives great trouble to the operator, as it cannot run through the cannula, and when broken up by the hand much haemorrhage into the cavity of the tumour is often set up before the pedicle can be reached and secured; besides, the main wall of the cyst is usually soft in these cases, and easily ruptured by the fingers or knuckles, yet it is particularly advisable not to allow any colloid material to escape into the peritoneal cavity."

Again (p. 109):—

"In the cases of ruptured colloid cysts which I have observed, peritonitis invariably existed; the omentum, when bathed by colloid fluid for a prolonged period, becomes very much thickened and looks like a mass of boiled sago with small blood-vessels running over it."

"One of these colloid cases was very remarkable. The patient was a healthy woman about 35 years of age. . . . On laying open (the peritoneum) several pounds of free colloid material escaped, or were removed by the hand of the operator, and the cyst was found to be widely rent, with exceedingly soft walls, and with a deep pelvic adhesion. The peritoneum was found to be intensely injected wherever it was exposed; yet, notwithstanding the extreme degree of extravasation of colloid material and these objective evidences of peritonitis, the clinical symptoms of that disease were absent."

In the *Obstetrical Transactions*, vol. xxiv, 1882, p. 93, is a case recorded by Dr. John Williams, the only one of the kind recorded in the Transactions of the London Obstetrical Society. It was shown as a dermoid cyst of the ovary with a myxomatous growth of the peritoneum, and occurred in a married multipara, aged 50, who had noticed enlargement of the abdomen for about nine months before her sudden death from syncope. A good account is given of the post-mortem appearances by Victor Horsley.

In addition to the term colloid cancer of the ovary or peritoneum various other names were applied to the condition. *Pseudomyxomatous* *degeneration of the peritoneum* (Mennig) and *chronic pseudomyxomatous peritonitis* (Virchow) suggested that the peritoneum was the primary seat of the disease. *Myxoma of the ovary* (Netzel) ascribed the gelatinous effusion to the organ in which it usually originates. In 1884 Werth showed that the myxoma-like masses arose from a burst ovarian cyst, and that the peritoneum did not secrete the material, but, on the contrary, put out fine connective tissue processes with newly formed vessels in the futile attempt to absorb the firm jelly; the affection of the peritoneum was thus secondary, a plastic chronic inflammation due to the presence of foreign matter in contact with the surface of the serous membrane. He suggested the name *pseudomyxoma of the peritoneum* for the condition. Soon afterwards Olshausen and Ackermann demonstrated the presence of fresh living cylindrical epithelium in the jelly-like masses, and proved that in at least some instances true metastases are formed at a distance from the primary growth in the ovary. A further proof of the occurrence of true secondary deposits was found in the renewed growth of enormous masses of similar material after the removal of the ovarian tumour.

FREQUENCY OF PSEUDOMYXOMA.

In the course of my own practice I have met with six typical cases of pseudomyxoma of the peritoneum. To the end of 1911 I had operated on 331 patients with tumours of the ovary, among which were included 144 glandular pseudomucinous cysts. The proportion of pseudomyxoma among these latter was, therefore, rather higher than 4 per cent., which would appear to be unusually large.

Gelatinous cysts of the ovary do not always give rise to pseudomyxoma of the peritoneum. It has, of course, to be remembered that in very large ovarian cysts the contents of the small loculi at the base are firm and gelatinous, the peculiarity in the cases under consideration being that the contents are jelly-like even in the largest loculi, instead of the consistence becoming thinner in proportion to the increasing size of the alveoli, as is the rule.

UNRUPTURED GELATINOUS OVARIAN CYSTADENOMA.

In addition to the six cases of typical pseudomyxoma there have been among my 144 glandular cysts five others in which the contents have been gelatinous, although there has been no extensive effusion into the peritoneal cavity. These are briefly alluded to here for the sake of completeness. A. Martin ("Die Krankheiten der Eierstocke," &c., 1899, p. 662) states that six of his cases had contents of syrupy consistence, and to these he adds six older cases from his experience. In four of the twelve cases the cyst had burst, and the condition was one of myxomatous peritonitis. No details are given of the other eight cases. It would appear, therefore, that in from one-third to one-half of the cases of firm gelatinous glandular cysts coming to operation the cyst has burst and diffused its contents, giving rise to typical so-called pseudomyxoma of the peritoneum.

In four out of my five unruptured firm gelatinous cysts the patients were single women, the fifth was a VI-para. Three of the women were under 40, so that, as will be shown presently, there was a marked difference from the class of patient in whom pseudomyxomatous peritonitis is found. In most of the cases a certain quantity, usually small, of free soapy exudation was present in the peritoneum, although no rupture or perforation of the cyst could be made out.

One of the cases is of peculiar interest, in that after removal of a right-sided cyst a second one grew in the left ovary to the weight of 3 lb. within five months. The left ovary had been observed at the first operation to be shrivelled and senile in appearance. The second cyst had burst, discharging a large quantity of mucoid fluid into the peritoneal cavity. Both cysts were proved by the microscope to be simple glandular in structure. This case was further of interest in that the patient had a fibromyoma and later developed adeno-carcinoma of the body of the uterus, of which the first symptom appeared within a year of the second ovariotomy, the patient dying about six years later. The removal of the two ovaries caused regression of the fibroid, but did not prevent the subsequent malignant development in the uterus—an important condemnation of the operation of double oöphorectomy for uterine fibroid.

Among the six ovarian tumours in the five patients under consideration, three had twisted pedicles, an occurrence that was not noted once in my six cases of pseudomyxoma, although it may have been present in Case I. In another of the unruptured cases the tumour grew twenty-five years after a cyst of the other ovary had been removed.

In addition to my eleven cases of solid gelatinous ovarian tumours, a patient, probably belonging to the same group, died in the General Hospital in the year 1898; and this case is of peculiar interest in that there was a large metastatic growth in the middle lobe of the right lung. The patient had been operated upon seven and a half years previously by the late Professor Taylor, to whom I was indebted for brief particulars of the operation.

E. G., aged 32, was operated upon by Professor J. W. Taylor on November 24, 1890; double ovariotomy; the larger tumour, that of the left side, half solid, papillomatous in one part, weighed 2 lb. Considerable fluid in the abdomen. The woman continued well for seven years until three months before her admission to the General Hospital on February 14, 1898. She then complained that there had been general rheumatic pains and wasting, and that for five weeks the right leg had swelled; two days after admission the left leg also began to swell. The patient was very ill, rapidly became worse, and died on March 7. At the autopsy, which was made by Dr. Stuart Macdonald, a mass of new growth containing mucus was found occupying the middle lobe of the right lung. An embolus was present in one of the large branches of the pulmonary artery leading to the lower lobe of the right lung. In the right iliac fossa a growth the size of a coconut sprang from the ilium close to the pelvic brim; on section viscid and tenacious fluid of a brown colour escaped; the growth was extremely cystic and contained a large amount of mucin. Microscopical sections of the growth in the lung resembled those of proliferating ovarian cyst.

INCIDENCE OF PSEUDOMYXOMA.

In age, parity, and relation to the menopause my experience agrees closely with the results of Strassmann in his thirty-six collected cases. Pseudomyxoma of the peritoneum occurs most frequently between the ages of 40 and 60; it is uncommon below 30, and is occasionally seen in women of more than 70 years of age. Of my six patients, the youngest was 38 and the oldest 74; the other four were between 40 and 60. The affection is uncommon in single women and is most frequently found in married multiparæ. My youngest patient was single, all the others had been married and borne children; one was a widow, and one was operated upon a fortnight after delivery of her sixth full-term child. Only two out of twenty-nine of Strassmann's cases occurred in single women; of twenty-two married patients only one was nulliparous. Menstruation is usually not affected, but a large proportion of the women have already passed the menopause. In three of my cases the menopause had occurred at the ages of 43, 50, and 51; in one woman, aged 48, the periods had been irregular and scanty for fifteen months, until three months before the operation, when they again became regular and normal. In a fifth case the periods were unaffected. The sixth patient was pregnant; labour was normal at full term, and uterine involution appeared to be proceeding at the normal rate.

CLINICAL COURSE.

The onset, symptoms and physical signs do not differ remarkably from those of the ordinary glandular cyst of the ovary. The growth is generally rapid, the abdomen attaining a large size in a comparatively short time, as a rule within a few months. Pain is often absent; there is neither tenderness nor notable evidence of irritation of the peritoneum. General emaciation is common and may be rapid. Among my six patients enlargement of the abdomen without pain had been noticed for from three and a half months to nine months, and was the first symptom in four cases, including one in which the abdomen was noticed at the third month of pregnancy to be unusually large. In one patient the breast had been removed for cancer by Mr. Gilbert Barling four years previously, and the first symptom was abdominal pain, followed a month later by enlargement. In the sixth case swelling of the legs was noticed two months before the abdominal enlargement. Weight and aching in the lower abdomen was complained of in one case, and in two others there was complaint of abdominal pain. General emaciation was a notable symptom in two-thirds of the women; two of them had noticed that they were passing very little urine. The time between the appearance of the first symptom and operation was less than four months in two, and in none more than eleven months; the growth is therefore unusually rapid, an observation that again agrees with that of Strassmann.

The physical signs are those of a large ovarian cyst, the outlines being as a rule not very well defined, and the consistence elastic. Enlarged veins were present to a notable extent in every one of my cases. The umbilicus was natural in one case, obliterated or pouting in the others. A fluid thrill was usually to be obtained with greater or less distinctness, but was absent in one of my cases. Signs of free fluid were only found in one case, where there was a well-marked dipping sensation through fluid on to the surface of a solid body. Tenderness to palpation was noted only in one of the patients, the one who had been delivered at full term a fortnight previously. In nearly every case internal pelvic examination enabled the lower convex end of a cyst to be made out with fair distinctness; this was above the brim and to one side in two cases, in front of the retroverted uterus in two, and behind the anteverted uterus in another case. The very free mobility of the uterus floating in free fluid, as in ordinary cases of ascites, is never present in the cases under consideration. The organ is more or less tightly tethered and displaced in close relation with the lower end of the cyst, in the same variety of ways as in ordinary glandular ovarian cysts.

In none of my patients was any symptom or sign elicited that pointed to a previous rupture or perforation of the cyst wall, and in none of them was the diagnosis of the peculiar nature of the ovarian affection suspected until the abdominal incision was made.

PATHOLOGICAL ANATOMY.

Pseudomyxomatous peritonitis arises in a glandular cyst of the ovary in an immense majority of cases. In a small minority an affection in many respects similar has its origin in the vermiform appendix ; of this variety about twelve cases have been recorded, mostly in males.

I have met with two cysts of the vermiform appendix which appear to throw some light on this condition, and am showing the specimens here this evening. The first was as large as the thumb, had jelly-like contents, and was removed from a married nullipara, aged 52, during a hysterectomy for fibroids. The second vermiform cyst was from a patient aged 68, and was diagnosed as an ovarian cyst ; this ruptured during bimanual examination and allowed the escape of 6 or 8 oz. of jelly-like material into the peritoneum. There was no reaction of any kind, general or local, and the true nature of the condition was established twenty-four hours after the rupture, during an operation for uterine prolapse. In these vermiform cases the gelatinous consistence of the fluid is due to the presence of mucin ; no instance of the kind has been recorded in which there were true metastases such as are sometimes found in the ovarian cases. In the present communication it is proposed to deal only with the ovarian variety of pseudomyxoma.

The ovarian cyst in the cases under consideration is a multilocular one made up at its base of a very large number of small and medium-sized loculi from the size of a millet-seed or less to that of a walnut. The loculi are filled with the characteristic gelatinous material, transparent, homogeneous, and either colourless or faintly tinged yellow or green ; and they are divided by very delicate transparent connective tissue septa thinner than tissue paper and lined by columnar secreting epithelium, which is the source of the gelatinous material. The epithelium is arranged in a single regular layer, and is seen in different stages of rest and activity. When at rest or discharged the cells have a finely granular protoplasmic body, with an oval, darkly staining nucleus placed vertically at about the middle of the cell (figs. 1 and 2). When the cells are moderately filled with secretion this is collected in the central or distal part of the cell, which becomes clear, glassy, translucent, and swollen (fig. 3). The base of the cell is still formed of finely granular protoplasm, and the nucleus is placed at the junction of the two zones. In a still later stage (fig. 4) the cell is seen filled to bursting point with

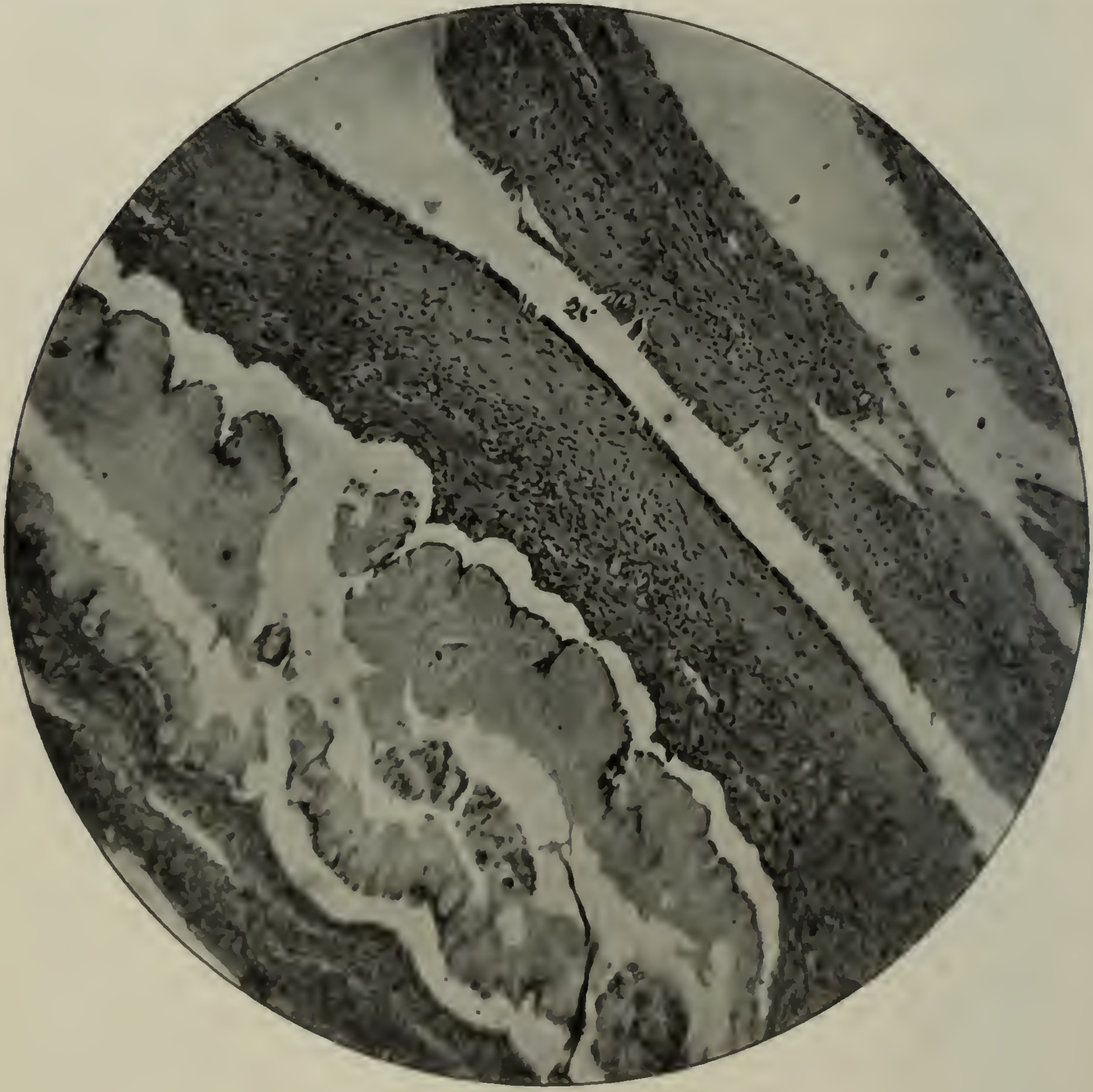


Fig. 1.

Section of ovarian pseudomyxoma showing alveoli lined by a single layer of secreting epithelium. An empty collapsed alveolus is seen lined by a single layer of resting epithelium; a bunch of cast-off cells is seen in the lumen. In the lower loculus a gelatinous material has shrunk and dragged the epithelium from its attachments. The secretion in the cells is seen to be continuous with the jelly-like contents of the loculus.

a clear opalescent secretion continuous with the jelly-like material of similar appearance that occupies the loculus; the basal part of the cell's protoplasm often cannot be seen, and the nucleus is thrust down to the attached end.

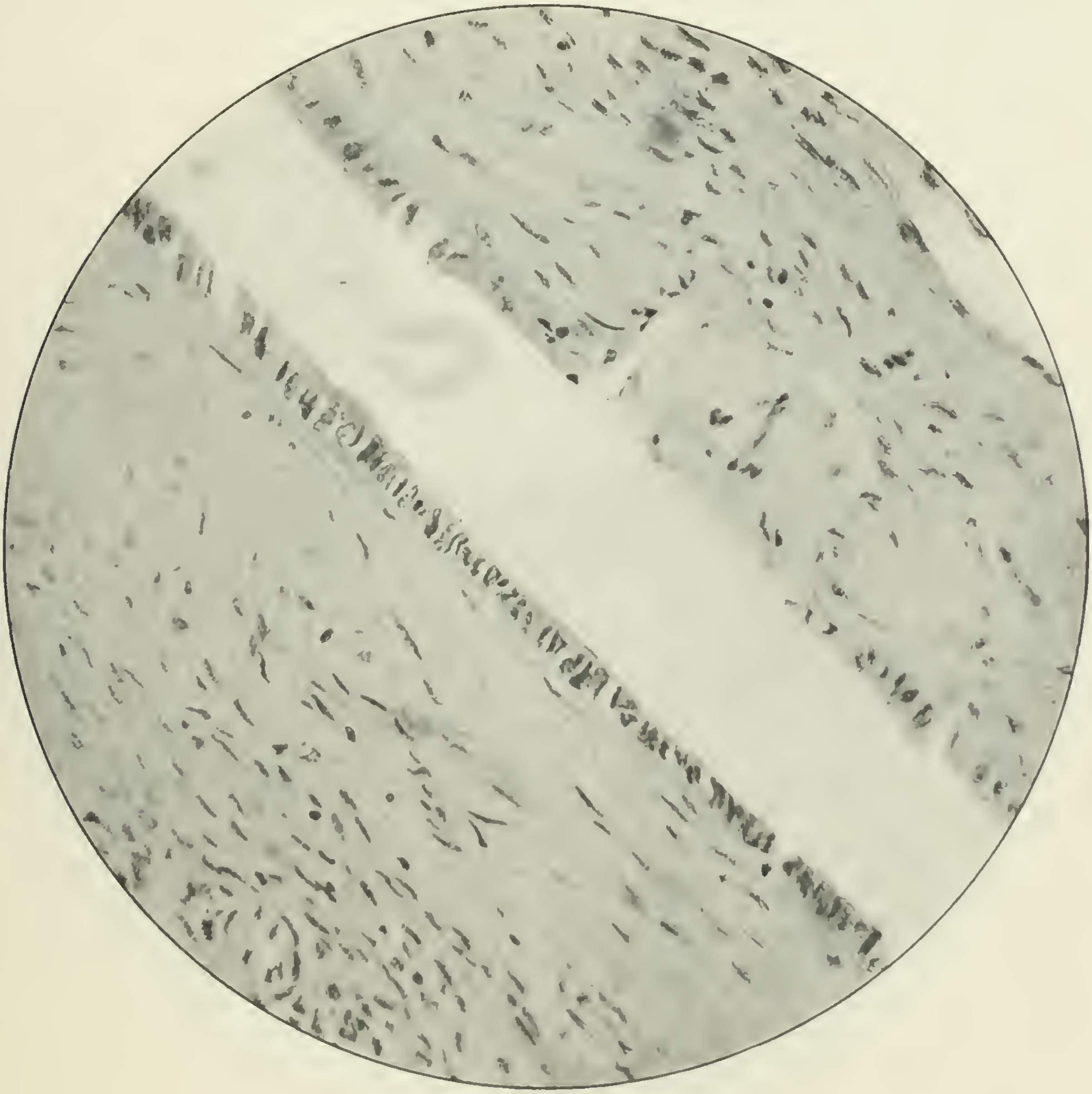


Fig. 2.

An empty alveolus lined by a single layer of columnar epithelium cells in the resting state. The nuclei are oval and placed vertically near the middle of the cell bodies and the free ends of the cells contain no pseudomucin, or only a minute quantity.

The pedicle of the cyst was well formed in four of my cases, in one of which (Case I) there was a hæmatoma around the ovarian vessels, for which no cause could be made out. In one instance (Case V) the growth had invaded the broad ligament, and at the operation there was some difficulty in clearing the disease at the lower end. In the sixth instance (Case II) there was a pseudo-intraligamentary pedicle, the cyst having developed in an ovary bound down by old firm adhesions.

The Fallopian tube is generally normal and unaffected, but may be embedded in the gelatinous exudation, as in Case II, or adherent to the surface of the ovarian cyst. The mesosalpinx is usually free, but may occasionally be found opened up by the growth of the ovarian cyst, as in Case VI.

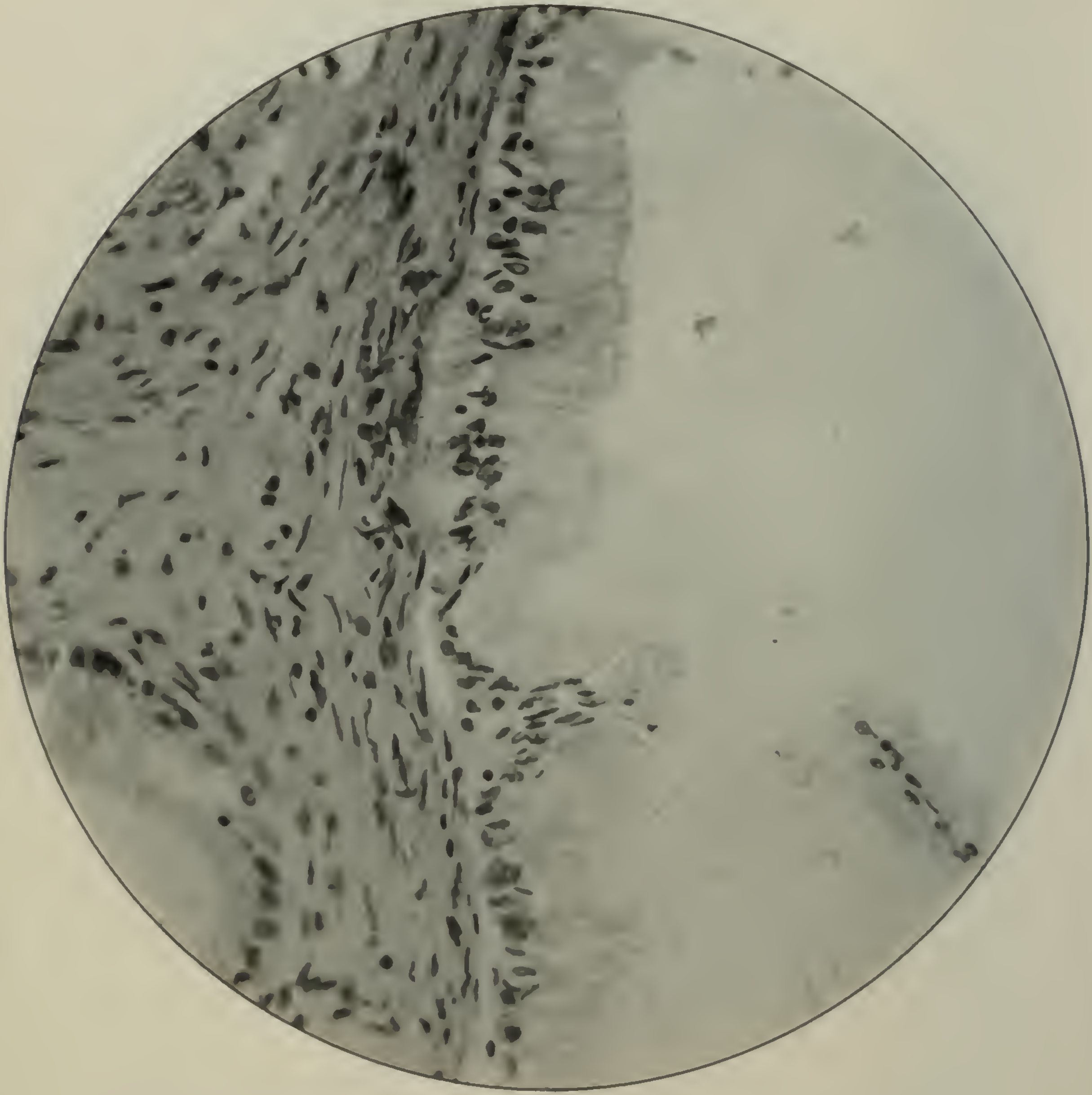


Fig. 3.

Epithelium cells filled with secretion in the upper or free ends.

In none of the six cases was the second ovary affected by the new growth; in the case (II) with pseudo-intraligamentary development the appendages of the opposite left side were fixed among themselves and to the side of the pelvis and back of the broad ligament by old dense fibrous adhesions; these had involved the ureter, leading to its dilatation and to hydronephrosis. In one case (V) there was a dermoid loculus in the midst of the ovarian cyst. A similar concurrence has been noticed several

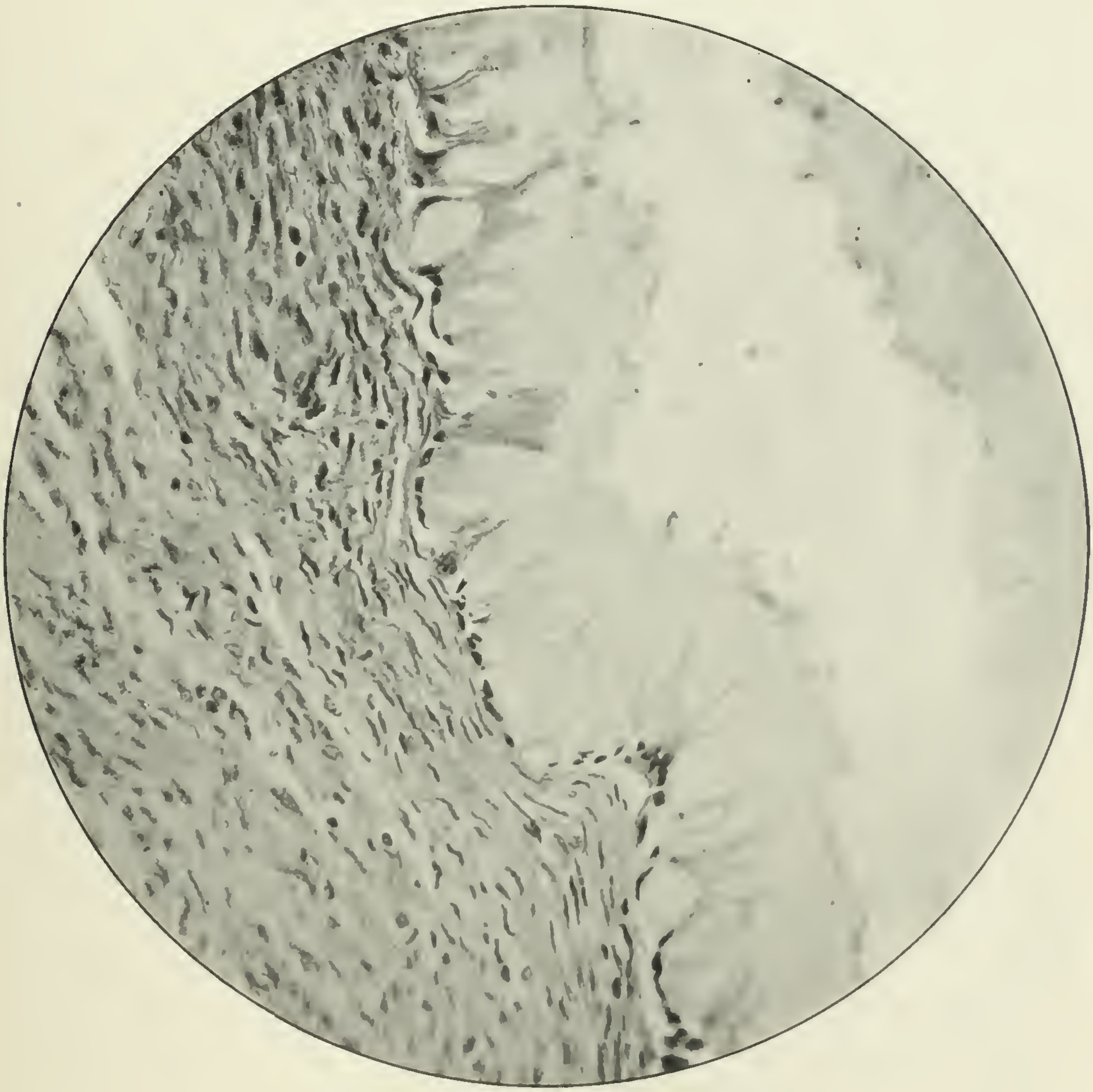


FIG. 4.

Epithelium cells bursting with secretion which is continuous with the jelly-like material filling an alveolus; the nuclei are pressed down on to the basement membrane.

times by other observers (Strassmann, John Williams), and is, besides, not very uncommon in connexion with glandular ovarian cysts in general.

In two of my six cases the uterus contained fibromyomata (Cases IV and V). In Case III the uterus a fortnight after delivery at term was apparently undergoing normal involution.

The gelatinous material is alkaline in reaction; it swells up and gradually dissolves in normal saline solution, and in weak potash, but is not soluble in acetic acid. In three cases (II, III and IV) the jelly was tested for the presence of pseudomucin with a positive result in each case.

Towards the distal pole of the ovarian tumour the loculi become larger and the capsule of the tumour, as well as the dividing septa, becomes even more delicate and thin until finally it gives way at one or more places and the jelly-like material oozes quietly into the peritoneal cavity. This process appears never to give rise to definite symptoms; it would seem to occur in a gradual and gentle manner as the result of a mere dehiscence, and not of a violent or sudden perforation or rupture. When rupture has taken place the jelly-like material continues to be poured out in large quantities into the peritoneal cavity, where it comes in contact with all the organs. The tenacious consistence appears to prevent the material sinking by gravity into the lower part of the cavity and pelvis; in this respect it differs markedly in its behaviour from free limpid fluid. The jelly appears to have a tendency to be carried into the upper parts of the cavity, where it is commonly found between the diaphragm and the upper surfaces of the liver, spleen, and stomach. In most cases the omentum soon comes into intimate relation with the effused jelly; sometimes it is found adherent to the upper front of the ovarian cyst, more commonly it is free, but surrounded and infiltrated by the gelatinous material, forming a broad, thick, firm plate—the so-called omental cake. In four of my cases the omentum was transformed into an omental cake; in Case V it was not affected; in the notes of Case IV its condition is not mentioned.

The parietal peritoneum is thickened, opaque, and has lost its gloss; where the gelatinous material is more closely in contact with it the surface is often found velvety or granular, or covered by fluffy adhesions after the jelly is washed away. The peritoneum covering the uterus, the bladder, the appendages of the opposite side, and the intestines, presents similar appearances where the jelly-like substance has been adherent. Occasionally, numbers of small transparent prominences, like boiled sago grains, are seen, or better felt, on some parts of the peritoneum. These were notably present on the pedicle and back of the broad ligament in Case I, and over the intestinal walls in some of the other cases. In Case II innumerable small cysts were found growing in the pelvic peritoneum at the autopsy on the patient dead from a psoas abscess more than two years after the operation for pseudomyxoma. In Case VI there was a cyst, the size of a walnut, in the subperitoneal tissue of the abdominal wall, and another of about the same size burrowing under the peritoneum on the posterior aspect of the ileo-cæcal junction; under the microscope no epithelial lining could be made out in these two cysts, which, therefore, did not appear to be metastatic, but due rather to attempts on the part of the subserous tissues at absorption or encapsulation of the gelatinous effusion.

The affection of the peritoneum and omentum in these cases has given rise to much puzzling and discussion. Mennig, and lately Westermark and Annell, have considered the gelatinous mass to be the product of a specific peritoneal affection of the nature either of a myxomatous degeneration or of a chronic productive inflammation. In the subserous tissue spaces are often seen filled by translucent, faintly stained material, which may give the impression of a mucous degeneration of the connective tissue (fig. 5). These appearances are, however, almost certainly due to attempts on the part of the tissues to absorb the jelly-like material, which is probably softened and partly liquefied by the action of the endothelium or of a serous exudation, and then penetrates into the lymphatics or tissue spaces. Where the gelatinous material is in close contact with the surface of the peritoneum or omentum the endothelium is sometimes seen to be quite intact and unchanged; more frequently the endothelium is lost, and filaments, bands, and lamellæ of delicate connective tissue grow out from the subserous connective tissue and penetrate the jelly, carrying thin-walled vessels of new formation. A certain amount of infiltration with round cells is seen in the immediate neighbourhood of the vessels, as well as lines and collections of large plasma cells with round or oval nuclei, and a large amount of well-stained protoplasm; but the cellular infiltration is never very marked (figs. 5 and 6). These appearances, together with the presence of the gelatinous material in the interstices of the tissue, appear to show clearly that the peritoneum attempts to absorb or to encapsule the jelly-like substance, which acts as a foreign body; a chronic inflammation is the result, and the term chronic pseudomyxomatous peritonitis is justified for the majority of the cases. The final result of this peritonitis may be that the remains of the jelly may be very slowly but entirely absorbed; or that the encapsuled collections may persist indefinitely as cysts; or, as shown in the autopsy in Case II two years and four months after operation, that firm thick adhesions may eventually be left, or dense opaque white fibrous thickenings of the peritoneum.

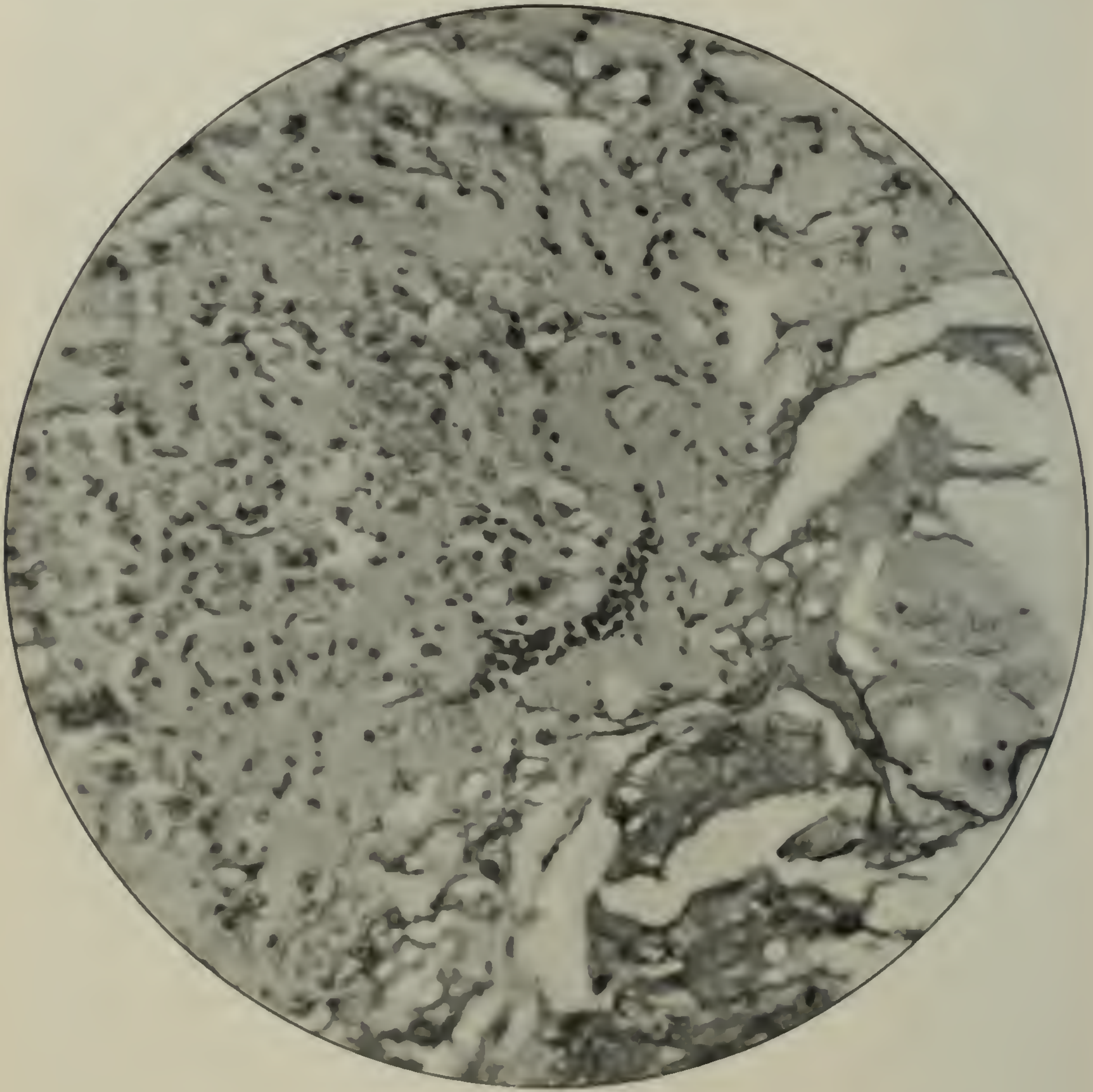


Fig. 5.

A section showing infiltration of the omentum by the gelatinous material, a large collection of lymphocytes in a lymphatic vessel, and a considerable number of the swollen plasma cells throughout the œdematous-looking tissue. The adherent collection of jelly at the right lower part of the section is being invaded by newly formed vessels and delicate bands of connective tissue.

In an unknown proportion of the cases true implantation metastases are found. Living and active strands of the peculiar secreting epithelium escape from the ovarian cyst along with the effused jelly, and the epithelium preserves its vitality after becoming attached at a distance from its seat of origin. The attachment may be to any part of the surface of the peritoneum, parietal or visceral, or apparently the

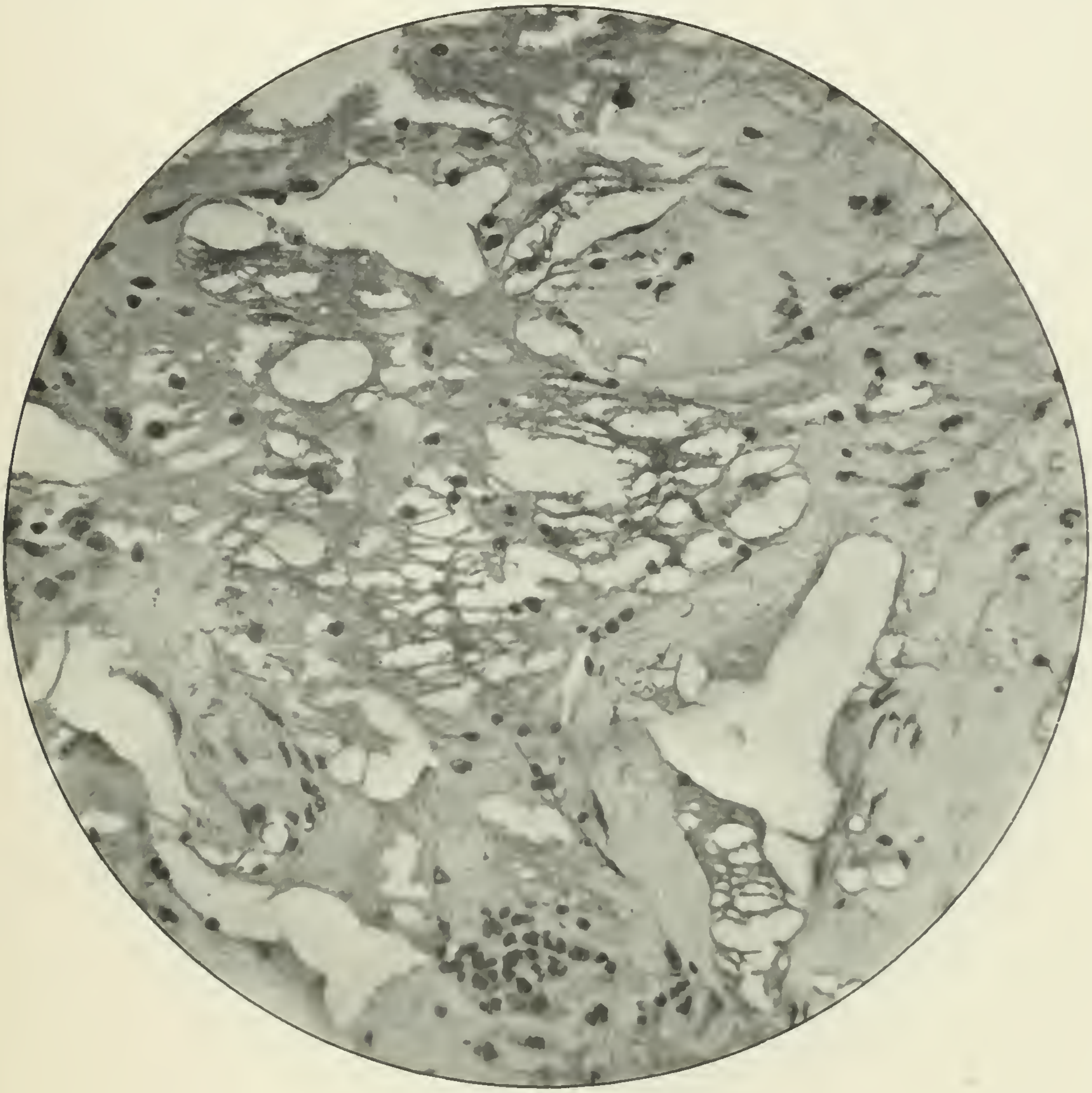


FIG. 6.

A section from the same omental cake under a high power, showing the invasion of a portion of adherent gelatinous material by strands of young connective tissue and newly formed vessels. The same two kinds of cells are present as in the previous sections and are evidently concerned in the absorption of the effused jelly.

epithelium may be taken into the spaces of the subserous tissues and there grow. In this way these cysts sometimes pass over the borderline that separates the benign from the malignant new growth. That the implantations are not necessarily confined to the peritoneal cavity would appear to follow from the observations at the post-mortem on Taylor's case above recorded, where a large metastatic growth was found in the middle lobe of the right lung. In Case II, in the omental cake

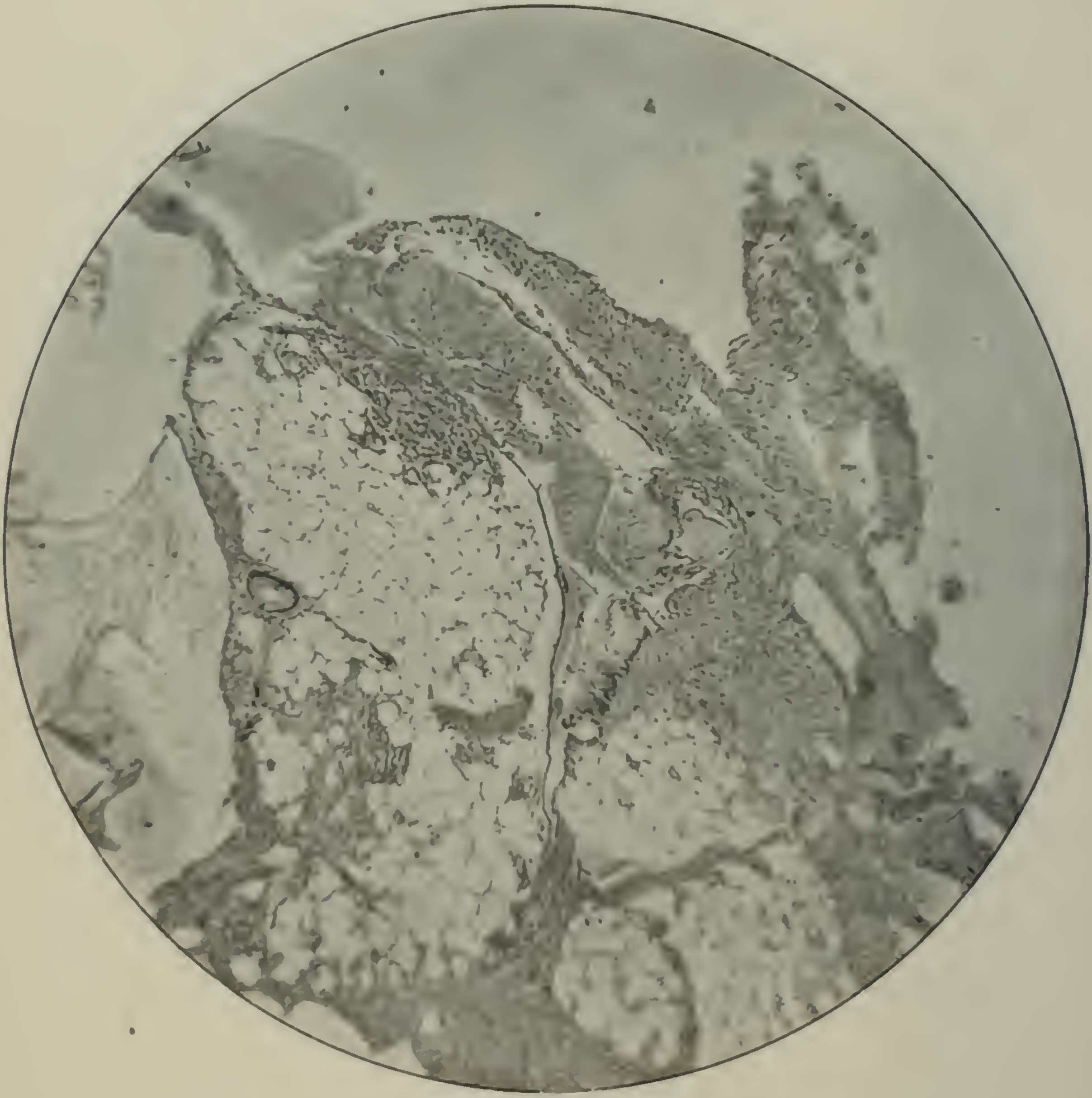


Fig. 7.

Section taken from a metastasis in the omentum in Case II. Gelatinous material is adherent on the surface and penetrates to a small extent; the fatty lobules are infiltrated in patches with wandering cells. Three alveoli are present, lined by a single layer of typical cylindrical secreting epithelial cells.

small epithelium-lined cysts were found, as well as strands of living epithelium not forming a complete lining to a cavity (figs. 7 and 8). In none of my other cases was it possible to demonstrate true epithelial metastases.

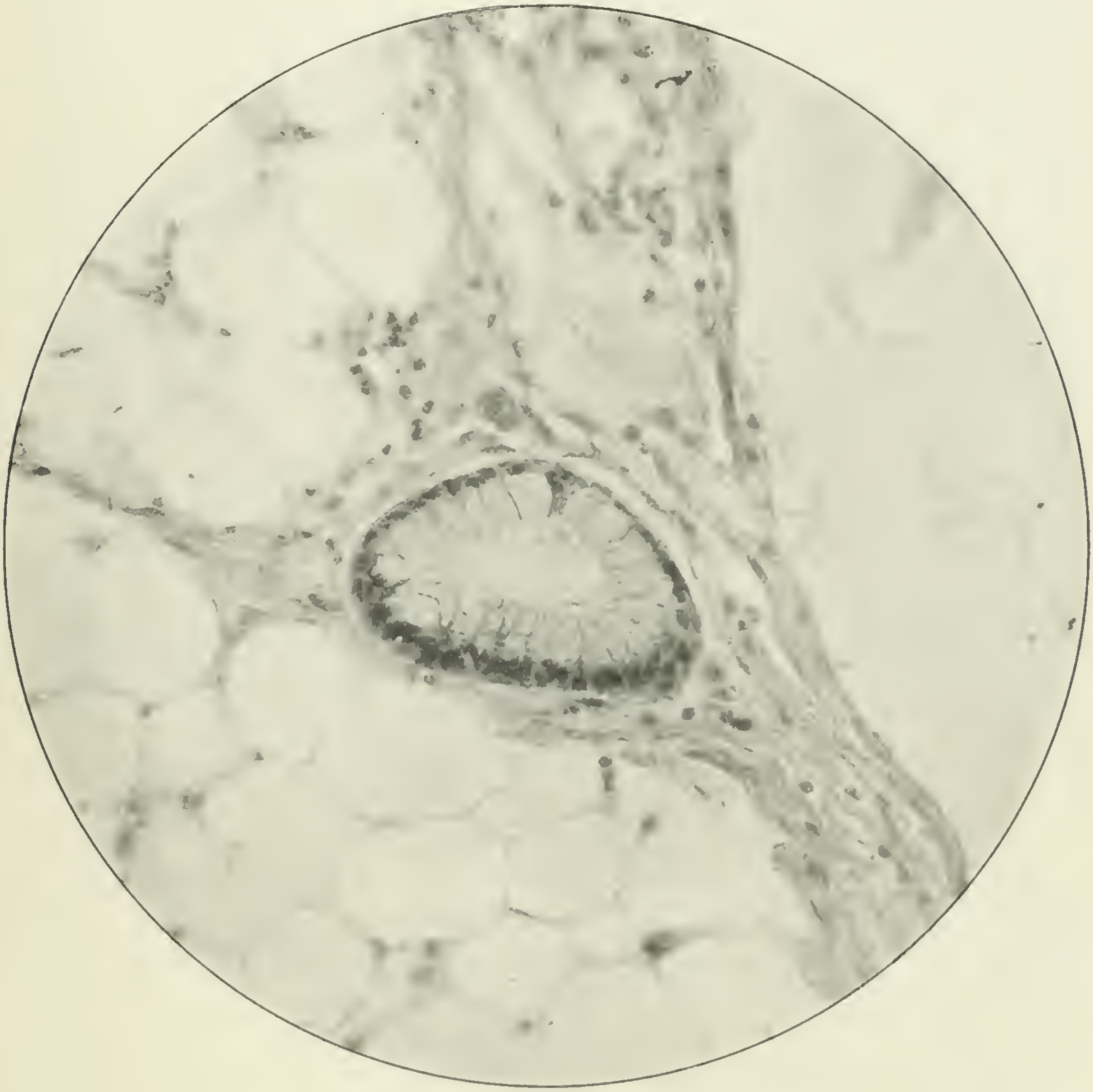


FIG. 8.

A metastatic alveolus from same section under a high power.

TREATMENT.

The affection leads in no very long time to death from continued growth of the cyst and gradual exhaustion of the patient. Puncture of the cyst has proved not merely useless but highly dangerous; the jelly-like material will not flow through a cannula, and germs are not unlikely to be introduced. In 1891 Strassmann published an important paper in which he collected and analysed thirty-six cases. In ten of these the abdomen had been tapped, with a fatal result in two.

The only method of treatment that affords a chance of success is the surgical removal of the cyst and, as far as possible, of the whole of the gelatinous effusion. The latter task has been attempted in vain by scooping out with the hands and sponging; the only effectual means is by copious flushing, and for this purpose it is of the highest importance that the right fluid should be used; this, fortunately, happens to be the one in common use, normal saline solution, which causes the jelly-like masses to swell up and become loosened from their attachment to the peritoneum. Plain sterile water is inferior for the purpose to normal saline, and boracic lotion does not loosen the jelly. I believe the relatively good results obtained in my six cases were due in large measure to the use of copious washings with saline solution. Five of my six cases made a good recovery from the operation. The first case died on the ninth day from ileus due apparently to the retention of 2 or 3 oz. of the jelly in the right flank; in this case I had used boracic lotion to flush the peritoneum. In Case V two punctures of the abdomen three days before the operation were fortunately not followed by any untoward consequences, although one of them brought away a little cheesy material from the dermoid loculus that complicated the tumour.

PROGNOSIS.

Laparotomy was performed in thirty-three of the cases (eight after tapping) collected by Strassmann, and sixteen of the patients died within four weeks. In eight of the fatal cases there were no traces of sepsis or of purulent infiltration at the autopsy. The patients died from the fourth to the ninth day, apparently from toxaemia due to the breaking down of the gelatinous material. Only fifteen cases were cured by the laparotomy, and of these not more than five made a smooth convalescence; in the others there was more or less fever, and in three threatened ileus. The outlook in cases of this nature was, therefore, very unfavourable, the primary mortality was great, and in those which recovered recurrence frequently took place.

The outlook as regards freedom from recurrence must always be doubtful, even in the favourable cases where no epithelial transplantation has been discovered at the operation; small buds may lurk unobserved in some of the recesses of the peritoneum, may remain latent for a longer or shorter time, and then burst into renewed activity. Further observations are required to show how far improved methods of operation are proving efficient in promoting not only a better immediate mortality, but a more favourable outlook as regards freedom from recurrence. According to Pfannenstiel, the remote prognosis is not very good; the results have been better of late years, but as a rule there is recurrence, often after many years. He refers to a case operated upon by Fritsch for the first time in 1883, for the second time in 1886, and for the third in 1897; on the last occasion 40 lb. of jelly were removed from the sixty-six-year-old patient, who was not at all cachectic. The scar burst four weeks after the operation, but six months later the patient was in good general condition, though with a small abdominal fistula. Kapp thinks the results are now improved; of six patients from Zweifel's clinic five were alive and well, four of them from seven to ten years after operation; in none of them were true epithelial metastases found.

Of my own cases, five recovered after operation; one of them, in whom there were true metastases, remained well for more than two years, and then died of a psoas abscess of unknown origin; many small cysts were present in the pelvis, so that renewed active growth might have set in at any time. Of the other cases, three remain well after more than eight, seven and two years respectively, while the fourth was operated upon as recently as November, 1911.

BIBLIOGRAPHY IN CHRONOLOGICAL ORDER.

1872. Spencer Wells. "Diseases of the Ovaries," p. 55.
1873. Atlee, W. L. "Ovarian Tumours," Philad., pp. 372-74.
1874. Beinlich. *Charité Ann.*, Berl., i, pp. 403-11.
1880. Mennig. Dissertation, Kiel.
1881. Thornton. *Med. Times and Gaz.*, i, p. 213.
1882. Mayer, G. *Charité Ann.*, vii, p. 417-22.
Williams, John. *Trans. Obst. Soc. Lond.*, xxiv, p. 93.
Netzel. *Hygiea*, 1882 and 1883; cf. *Centralbl. f. Gyn.*, Leipz., 1883, vii, p. 102, and 1884, viii, p. 95.
1884. Doran. "Tumours of the Ovary," pp. 15 and 109.
Werth. *Arch. f. Gyn.*, Berl., xxiv, p. 100.
Baumgarten. *Virchow's Archiv*, xcvii, pp. 1-11.
1885. Olshausen. *Zeitschr. f. Geb. u. Gyn.*, Stuttg., xi, p. 238.
Macdonald. *Edinb. Med. Journ.*, xxx, pp. 1021, 1073.
v. Swiecicki. *Centralbl. f. Gyn.*, ix, p. 691.
Donat. *Arch. f. Gyn.*, xxvi, p. 478.
1885. Korn. *Centralbl. f. Gyn.*, ix, p. 817.

1886. Olshausen. Billroth und Luecke, "Handbuch der Frauenkrankheiten, ii, p. 386.
Netzel. *Centralbl. f. Gyn.*, x, p. 582.
Schillgtendahl. *Berl. klin. Wochenschr.*, xxiii, p. 23.
1887. Geyl. *Arch. f. Gyn.*, Berl., xxxi, p. 373.
Runge. *Centralbl. f. Gyn.*, xi, p. 233.
1891. Strassmann. *Zeitschr. f. Geb. u. Gyn.*, Stuttg., xxii, p. 308.
1896. Tóth. *Centralbl. f. Gyn.*, xx, p. 747.
Rueder. *Ibid.*, p. 173.
Kezmarsky. *Ibid.*, p. 747.
Tauffer. *Ibid.*, p. 717.
Wendeler. *Monatschr. f. Geb. u. Gyn.*, Berl., iii, p. 186.
1897. Kreschmar. *Ibid.*, v, Ergänzungsheft, p. 32.
1898. Pfannenstiel. In Veit's "Handbuch der Gynäkologie," iii, Heft 1, p. 328.
1899. Peters. *Monatschr. f. Geb. u. Gyn.*, x, p. 749.
Martin. "Die Krankheiten der Eierstocke (Wendeler)," Leipz., pp. 180 *et seq.*
Gunzburger. *Arch. f. Gyn.*, lix, pp. 1-14.
1900. Kapp. Inaugural Dissertation, Leipz.
1901. Gottschalk. *Centralbl. f. Gyn.*, xxv, p. 726.
Lapthorn Smith. *Amer. Journ. of Obstet.*, New York, xliv, p. 50.
1905. Tóth. *Centralbl. f. Gyn.*, xxix, p. 540.
1906. Hirst. *Amer. Journ. of Obstet.*, liii, p. 345.
1908. Schumann. *Surg., Gyn. and Obstet.*, Chicago, vi, p. 15.

Case I.—Pseudomyxomatous peritonitis due to rupture of gelatinous multilocular cyst of right ovary; hæmatoma of the pedicle; omental cake; ovariotomy; death from ileus on the ninth day.

R. A., aged 55, was admitted to the General Hospital on June 13, 1896, complaining of an abdominal swelling of three and a half months' duration. The patient had had fourteen children and four miscarriages, the last pregnancy thirteen years before; there had been twins twice; the menopause occurred twelve years ago at the age of 43, and there had been no discharge afterwards. The abdomen was largely distended, especially in the lower half and on the right side; the umbilical depression was obliterated; numerous purplish lineæ albicantes and some enlarged veins were present. The enlargement was due to a uniform elastic, ill-defined tumour with regular surface. There was no fluid thrill; the percussion note was dull over the tumour, resonant in both flanks. The uterus was elongated, measuring 4 in. by the sound; it was drawn upwards and to the left, and the lower rounded end of the tumour could just be reached high upwards on the right. There was no complaint of pain, and the patient was generally well nourished. No abnormal physical signs were present in the chest. Urine acid, specific gravity 1022, contained no albumin, sugar, or blood.

On June 16 a 4-in. incision in the middle line below the umbilicus disclosed a cyst adherent over its whole anterior surface to the abdominal wall, the adhesions were easily broken down by the flat hand. The cyst wall had burst above and to the right, and a large quantity of thick, gelatinous, clear material had escaped into the peritoneal cavity. About as much of the jelly-like substance had escaped into the peritoneal cavity as remained in the cyst; it had become adherent to the peritoneum, which was very red, somewhat thickened, and had lost its smoothness and gloss. The jelly was partly scooped out with the hands and the cyst delivered. This had a moderately broad pedicle, about $\frac{1}{2}$ in. in thickness, from the right broad ligament; the outer half of the pedicle around the ovarian vessels was thickened by extravasated black blood, but no twist could be made out. The pedicle was tied with silk and the cyst cut away. The left appendages were normal, the ovary firm, and not larger than an almond. The gelatinous substance was now scooped out of the pelvis, the utero-vesical pouch, the right iliac fossa, and right flanks as far as possible, and the abdomen was flushed with a large quantity of boracic lotion; the peritoneum was then sponged dry, and the operation wound closed by deep silk sutures, no drainage being employed.

Condition found at operation: The tumour removed was a glandular cyst of the right ovary, with numerous small loculi filled with firm, clear, transparent gelatinous material. The Fallopian tube was normal, and the mesosalpinx free. Inside some of the loculi could be seen, and better felt, some small clear papillomatous projections here and there. Some small sessile, solid, semi-translucent prominences, like boiled sago grains, were present on the surface, especially close to the pedicle and on the back of the broad ligament. The gelatinous substance did not contain vessels or membrane, or show any kind of structure to the naked eye. The loculi were lined by a single layer of epithelial cells. The omentum was much thickened and adherent to a lot of the jelly-like substance; it was cleaned as far as possible, but was not removed. Where the jelly-like substance was found to be adherent to the peritoneum this was slightly roughened and uneven on the surface, reddened, dull and matt, and thicker than natural.

Course after operation: After the operation there were constant vomiting and gradually increasing distension, especially in the upper abdomen. The patient passed urine naturally and flatus freely; nutrient enemata were retained well.; the tongue was furred, but remained moist; the temperature was not raised. The wound did well and healed by first intention. After the fifth day the patient appeared to be somewhat better, but on the eighth distension increased and vomiting returned; the bowels had not been moved since the operation in spite of repeated enemata, although plenty of flatus had been passed. The patient died on the evening of the ninth day after operation.

Autopsy: A post-mortem examination was made by Dr. Douglas Stanley, who observed that the operation wound was healthy and healed by first intention. The pedicle was perfectly healthy looking, the ligature covered in by peritoneum, and there was no fluid in the pelvis. There was enormous distension of the intestines, especially of the transverse and descending colon, which were almost as large in diameter as a fœtal head; the intestines over the right part of the abdomen had lost their shining appearance and were loosely adherent. The omentum was greatly thickened to $\frac{3}{4}$ in. or more, and had a solid, greyish appearance. At the upper part of the peritoneal cavity, in the right flank, forming a thin irregular layer over an area as large as the open hand, were some remains of the jelly-like material that had been removed: this measured perhaps 2½ oz. in all, and did not appear to be in any way altered or broken down. There was no pus, and no free fluid of any kind, anywhere in the peritoneal cavity.

Case II.—Pseudo-intraligamentary cyst of the right ovary with metastases in the omentum; supravaginal hysterectomy with removal of right cyst and left appendages, and of omental cake. Good health for two years four months: death from right psoas abscess. Autopsy: Left hydronephrosis secondary to atrophic salpingo-oöphoritis: old adhesive peritonitis; recurrent small cysts in pelvis.

E. C., a widow, aged 48, was admitted to the General Hospital on November 21, 1900, complaining that since the last week in August there had been swelling with dull, aching pain and a feeling of great weight in the lower abdomen. She had had three children and one miscarriage: the labours were all natural, and the last occurred in 1882. The catamenia had been irregular in the last eighteen months, with less loss than usual, and the intervals had been sometimes two months, and once as long as four months, but the periods had again been regular monthly for the three months previous to admission. The patient stated that for two months the amount of urine passed had been very small. She was well nourished and healthy in appearance. There was a large swelling in the abdomen, extending to 3½ in. above the umbilicus, and rather more prominent on the right side. The umbilicus was natural: there were a few large veins over the abdomen: the skin-cracks were few in number and badly marked. The abdominal swelling corresponded to a rather soft, elastic and not very well defined tumour, over which the percussion note was dull. There was resonance in both flanks. Fluctuation wave was present from side to side of the tumour, but was not very free. On vaginal examination the cervix was found to have a broad opening and to be fixed a little in front of the middle of the pelvis; behind it the fixed lower rounded end of the abdominal cyst was felt and was not movable. The body of the uterus, not enlarged, was anteverted below the cyst, and somewhat movable.

On November 24, the patient being in the horizontal position, a 4-in. median incision was made, and on opening the peritoneum, which was thick and firm and had lost its shine, a mass of clear, firm, gelatinous material, like calves' foot jelly, was found occupying the cavity of the abdomen. This material had to be scooped out with the hands, and some time was spent over the proceeding. The intestines which came into the wound were normal in appearance. From the pelvis a cyst with a definite, very thin wall, united by loose adhesions to the front of the sacrum, was brought up, breaking much in the process. The peritoneum over the uterus and the bladder was thickened, red, and velvety. The uterus was dragged up into the wound with some difficulty. The left appendages were covered with adherent gelatinous material, and were, in addition, adherent among themselves and to the side of the pelvis and back of the broad ligament by old dense, firm fibrous adhesions; they were separated and brought up into the wound. During all this part of the operation there had been practically no bleeding: at about this time the patient suddenly became cyanosed, the breathing almost stopped, and the pulse became very small, but continued slow and regular. For the latter half of the operation very little anæsthetic was administered; subcutaneous injections of strychnine solution, and enemata of saline solution with brandy were given.

The broken remains of a multilocular thin-walled cyst, filled with thick gelatinous material like that just described, were attached to the uterus by the right broad ligament and extended down on the back of the broad ligament, to which and to the side of the pelvis there were very firm adhesions. At first it seemed that the broad ligament was invaded by the cyst, but afterwards it appeared that this was not the case, but that the cyst was very firmly united to its surfaces. In order to get below the cyst it was found necessary to remove the uterus, and this was done by a supravaginal operation, the left appendages being removed at the same time. Silk sutures were applied to the left ovario-pelvic ligament and to the round ligament; the ligaments on the right side were similarly secured; the bladder was stripped down, and the uterine vessels secured on either side. The cervix was then divided, and its anterior and posterior flaps brought together by silk sutures. A suture on each side then brought the peritoneum over the stump and united the ovario-pelvic ligament to it.

The omentum was now found to be transformed into a solid gelatinous cake, nearly an inch in thickness at its free extremity, and becoming gradually thinned towards its attachment to the transverse colon: a narrow strip close to the colon was free from infiltration, clear and transparent, but with numerous yellow septa of fatty tissue. The omentum was ligatured and divided close to its attachment. The peritoneal cavity was flushed out with hot salt solution, and the abdominal wound closed by three layers of suture, continuous catgut to the peritoneum, interrupted silk to the fascia, and continuous catgut to the skin; no drainage was employed.

There was much shock. Nutrient enemata with ½ oz. of rectified spirit were ordered to be given every four hours. Four hours after the end of the operation the patient was warm, the pulse 80, and the temperature normal. The patient made an excellent recovery and went home well on the twentieth day. The incision healed by first intention.

The gelatinous material removed at the operation, of which 10 pints were measured and a great deal lost, was clear and transparent, alkaline in reaction, soluble in normal saline solution and in potash, but not in acetic acid. To determine the presence or absence of pseudomucin the jelly was dissolved in salt solution and precipitated by absolute alcohol; the precipitate was treated by heating on a water-bath with 10 per cent. hydrochloric acid for three-quarters of an hour; the resulting solution then caused a reduction of copper on being tested with Fehling's solution.

The portions of ovarian cyst removed were irregular and broken, and for the most part made up of small loculi varying in size from a millet-seed to a walnut. The torn walls of what have been much larger loculi join these, and at one part is seen a portion of the Fallopian tube, not thickened. Towards the fimbriated extremity the tube enters an irregular adherent mass of discoloured gelatinous tissue in which it becomes indistinguishable: the first 2½ cm. from the cut uterine end of the tube are fairly normal, the next 3½ cm. are embedded in the gelatinous mass, and then the open fimbriated extremity is recognized with difficulty. Part of the wall of the left ovarian cyst is densely adherent to the left anterior wall of the body of the uterus: over the latter the peritoneal coat is roughened and granular with a few flaky adhesions. The right appendages are covered by a layer of gelatinous material and are shrivelled and adherent among themselves: the tube beyond the proximal 3 cm. enters the indistinguishable adherent mass, section of which shows the tube with the distended lumen and thickened walls.

The portion of omentum removed measures 21 by 8 cm., and varies in thickness from less than 1 mm. to 2 cm. It is irregularly thickened by gelatinous material, through which are scattered lobules of yellow, opaque fat. The lower border of the omentum is rounded and thickened to the size of the thumb.

Under the microscope the loculi of the ovarian cyst are divided by thin fibrous walls and lined by typical secreting glandular epithelium in various stages of discharge; this epithelium is entirely similar to that characteristic of the ordinary glandular or pseudomucinous cysts of the ovary. In the omentum are seen tracts of similiar epithelium taking the staining well, and in places forming a definite lining to well-formed loculi filled with the gelatinous material (figs. 7 and 8).

After-history: The patient afterwards presented herself for examination from time to time, and on September 25, 1901, was very well and had no complaints to make. There was, however, an elastic, rounded body the size of a tangerine orange to the right of the cervix, to which, and to the side of the pelvis, it was fixed. Six months later the lump had the same size and characters, and the patient was perfectly well, and so continued until about the middle of March, 1903. On April 3, 1903, the woman was seen in the out-patient room complaining that she had had severe pain in the lower abdomen and down the right leg. In the right iliac region a firm, inelastic lump, the size of a fœtal head, was present, extending down to the right side of the cervix, which was pushed somewhat over to the left. The right leg was drawn up and could not be extended. The scar of the former operation was flat and normal. The patient was cachectic, but stated that she had been quite well until the last fortnight. She was admitted again to the General Hospital on April 18, 1903, when her general condition was decidedly worse. During the next three days the temperature was almost continually somewhat raised, varying from 98·8° to 100·2° F. On the morning of April 21 it was 99·4° F.; the same evening 102·4° F. On this day an incision was made on the right side parallel to and about an inch above Poupart's ligament, and was carried down through the transversalis fascia; the subperitoneal space and the subjacent tissues appeared to be normal, except that there was slight œdema of the deeper structures. The patient was then placed in the Trendelenburg position, the incision was enlarged by the addition of a vertical incision at its outer end, and the peritoneal cavity was opened. Some small collections of greyish gelatinous material were present inside the right brim of the pelvis between the coils of intestine; at the right posterior part of the brim was a gelatinous cyst as large as a hen's egg; there had been widespread growth of the gelatinous cysts over the peritoneum. There was rather free bleeding from a coil of intestine that had been adherent, and drainage was therefore provided by a small strip of gauze; the wound was closed in three layers. Great shock followed, and in spite of free stimulation and transfusion, death took place at 2 a.m. on the following morning.

Autopsy: The report was as follows: The heart is small; the myocardium shows marked fatty infiltration, and both ventricular walls, but especially the right, are thin. The aorta is atheromatous; the pleura shows old fibrous adhesions, in places very firm, around the left base. There is no evidence of tubercle. The pancreas and suprarenal bodies appear healthy. The right kidney, of normal size, weighs $4\frac{1}{2}$ oz.; the capsule does not strip readily; the cortex in places is diminished and irregular; there is moderate fatty infiltration around the hilum; the pelvis and ureter are normal. The mucous membrane of the bladder is dotted with black pigment spots, probably from old cystitis. The uterus and ovaries have been removed. The site of the scar is covered by a mass of cystic growth, the size of a small orange, extending from the stump of the cervix up the right side of the pelvis between it and the adherent small intestines. On section the growth is seen to be made up of innumerable cysts varying in size from a pea to a large marble, the cyst walls being as thin as tissue paper and containing pale jelly-like substance slightly tinged with yellow. Beneath, and at the side of the growth, is thick, dense white fibrous tissue. Scattered over the floor of Douglas's pouch are several sessile cysts, generally with smaller daughter cysts growing from them. Two smaller cysts, the size of a pigeon's egg, are in the subserous tissue beneath the floor of the pouch. In the right iliac fossa a bulging tumour as large as the closed fist pushes forwards the cæcum. Pressure on this causes oozing of pus at the pelvic brim, where the pus mentioned above was seen; this point is near where a mass of cysts was removed at operation; the colour of the pus is that of a crushed strawberry. An incision into the tumour shows it to be a large abscess-like cavity containing at least a pint of similar fluid. The cavity extends upwards to the last rib; internally it is bounded by the bodies of the lumbar vertebræ; behind and externally by the lumbar and abdominal muscles; in front by the sheath of the psoas. Below it passes beneath Poupart's ligament for about an inch, and it also passes over the pelvic brim along the inner surface of the bony wall to the floor of the pelvis. The cavity has a thickened wall varying in thickness from $\frac{1}{8}$ in. to ½ in., composed mostly of thick fibrous tissue, but here and there, especially in front over the iliac fossa, translucent in appearance. The inner surface of the wall is very ragged and friable. The contents are shreds of softened muscle and a thick, pus-like fluid of the colour of crushed strawberry. The psoas, iliacus and obturator internus muscle are almost destroyed, only shreds being left. The transversalis muscle and fascia are also destroyed, so that the transverse processes of the lumbar vertebræ project into the cavity. The cavity has also penetrated for some distance downwards at the back between the layers of abdominal muscles. The vertebræ and ribs show no sign of caries, the periosteum is intact, and there is no sign of hydatid or actinomycotic disease. Is the cavity due to softening of an extensive subperitoneal pseudomyxomatous growth?

Case III.—Right ovarian pseudomyxoma rapidly growing in the latter half of the sixth pregnancy; operation sixteen days after natural delivery at term; omental cake. Patient well more than eight years later.

M. F., aged 43, was sent into the General Hospital under my care by Dr. Dudley Gill, of West Bromwich, on November 25, 1903, thirteen days after the delivery of her sixth child. All her pregnancies had ended at full term and all the labours were easy. About the middle of May, 1903, when three months pregnant, the patient noticed that her abdomen was becoming unusually large; the unnatural increase in size gradually became more marked, but there was no pain until about the sixth month, when severe pain began in the abdomen, and soon afterwards the patient began to suffer from shortness of breath. At full term, on November 12, 1903, natural labour took place of a living female child, which presented by the breech. After-pains were very severe, and the abdomen remained large, showing a daily increase in size until the day of admission to hospital. The breasts have remained flaccid, and there has been no secretion of milk.

In the last three months of pregnancy severe dragging and shooting pains often came on suddenly towards evening and would last far into the night; sometimes they began in the lower chest, and often the patient was impelled to get out of bed and walk about. Swelling of the legs, more marked in the left, came on, and for some weeks before admission there was a troublesome dry cough. The previous health had been, on the whole, good; the patient had scarlet fever at 14, occasional fainting turns in girlhood, weakness, and attacks of palpitation for a time when about 28 years of age. Menstruation began at 14, was regular of $\frac{28}{5}$ rhythm, the periods always preceded for two or three days by aching in the lower abdomen.

On admission, the woman was observed to be very thin, with typical ovarian facies, somewhat anæmic, with drawn features and anxious expression. She lies more comfortably on the right side. The abdomen is enormously enlarged, the umbilicus obliterated, and there are numerous enlarged veins, especially up the right side of the abdominal wall. The girth at the umbilicus is 43 in. There are pain and tenderness over the upper part of the abdomen, which is uniformly distended and firm elastic in consistence. Dullness to percussion is made out all over the right front of the abdomen and far into the right flank. The left flank and a part far back in the right are resonant. Above, a narrow band of resonance is made out below the liver dullness, but above the lower margin of the chest wall. The heart is pushed up so that the lower border is at the fourth rib. Very free fluctuation wave is obtained all over the area of dullness. Internal pelvic examination shows that there is a muco-purulent vaginal discharge, that the cervix is soft and patulous, and that the body of the uterus to the left and in front is of about the size natural a fortnight after delivery. The urine is acid, specific gravity 1026, contains no sugar or albumin: urea for twenty-four hours, 236 gr.

On November 28, 1903, with the patient in the horizontal position, a median lower abdominal incision, 4 in. in length, was made below the umbilicus, and passed straight into firm, jelly-like material which filled and distended the whole peritoneal cavity. Careful observation disclosed a delicate and friable cyst wall, as thin as tissue paper, adherent to the anterior abdominal wall, and separable by the flat hand; the cyst wall was incomplete, but had apparently been widely ruptured. A bucketful of the gelatinous material was scooped out with the hands and pressed out by the help of the assistant. At the lower part of the peritoneal cavity a mass the size of a football was attached to the right side of the uterus by a pedicle formed of the broad ligament: the mass was delivered and the pedicle secured with interlocking silk ligatures. The abdomen was then flushed with 4 gallons of normal saline solution, which washed away large quantities of the jelly from all the recesses of the peritoneum. The omentum was adherent to and infiltrated by some of the gelatinous material; a large portion was therefore tied off. The part that remained was thin and membranous, containing very little fat. All over the anterior wall irregular adherent patches of the jelly had caused the parietal peritoneum to become thickened, red, and velvety or granular. Some coils of small intestine were firmly glued together by the thick jelly, which could not be stripped off the surface without tearing and making it bleed from innumerable small points. The body of the uterus, a large as the fist, was velvety on the surface, with a little adherent jelly, which also involved the left tube and ovary; otherwise these appendages appeared to be normal. The abdominal wound was closed by three layers of silk sutures, and the patient was returned to bed in good condition. She was extremely thin, and was at once put on a water-bed, but in spite of every care the skin over the sacrum gave way and a bed-sore formed. There was a troublesome cough for some days, but otherwise convalescence was satisfactory. There was a little distension for the first three days: no vomiting; the urine was passed naturally eight hours after the operation. The highest pulse-rate was 108 on the morning after the operation, and temperature 100·6 F. the same evening. Union of the abdominal incision took place by first intention, the stitches were removed on the twelfth day, and the patient returned home, well in every respect, forty days after the operation.

On January 31, 1912, in answer to my inquiry, Dr. Gill kindly informed me that Mrs. F. remains well and able to perform her usual household duties.

Parts removed: Twenty-eight pints of the clear, straw-coloured, gelatinous material were measured; it swelled up and gradually dissolved in salt solution, and gave the chemical test for pseudomucin. The large mass of the cyst removed was made up of transparent greyish jelly contained in a very large number of small loculi up to the size of a walnut; the dividing walls were very thin and delicate, and in them numerous vessels were seen coursing. Sections of the parietal peritoneum showed loss of endothelium over most of the surface; great swelling and imbibition of the connective tissue fibres, and marked œdema, and several small diffuse hæmorrhages; there were no epithelial metastases. The degenerated portion of the cyst wall showed similar changes, but the swelling was more marked and the interstices of the tissues largely filled with a delicate reticular, lightly stained substance like fibrin; no epithelium was present. The omentum was continued at its surface into a mass of material which had become finely reticular in the hardening material, and through it were scattered, here and there, a few badly stained, degenerate, round and oval cells; nearer the surface of the omentum there was a great proliferation of large thin-walled vessels; in the superficial parts of the omentum proper there was a moderate infiltration with small round and plasma cells. No epithelial metastases were found.

Case IV.—Pseudomyxomatous peritonitis developing three and a half years after amputation of carcinomatous breast; left ovarian cyst removed by operation; uterine fibroids; patient well seven years afterwards.

Mrs. M. E., aged 54, who had had one pregnancy ending at term twenty-six years before, was seen on November 2, 1905, with Mr. Gilbert Barling, who had removed the breast for cancer three and three-quarter years previously. Five months ago pain and discomfort began in the abdomen, and three weeks later this began to become larger and more prominent. The patient had become much thinner in the last three or four months. The catamenia began at 14, and had been regular until the age of 51, when the menopause occurred. There was no family history of tumour.

Nine days later, on November 11, Mrs. E. was admitted to the General Hospital, when she was seen to have further wasted rapidly. The abdomen was larger; the umbilicus was pouting, but there was no other sign of free fluid. Percussion dullness had extended higher upwards on the left side and into the flank; the note was clear in the right flank. Enlarged veins were noted over the right side of the abdomen. The cervix was far back in the pelvis, and in the anterior fornix two firm, elastic, rounded, prominent nodules were felt, apparently connected with the lower end of the cyst wall.

Operation: On November 14, 1905, a median incision was made in the lower abdomen, prolonged afterwards to 7 in., and extending $1\frac{1}{2}$ in. above the umbicilus. The parietal peritoneum was thickened, dark red, and had lost its polish. Between it and the wall of a large cyst was a collection of firm, jelly-like material, interspersed with soft, thick, velvety adhesions. This substance extended all over the inside of the anterior abdominal wall. At the lower part of the cavity there was some free jelly-like material. At the upper part there were extensive adhesions which passed imperceptibly into the thick, free jelly: this was mostly transparent and colourless, but in places was greyish-yellow and slightly opaque. The jelly-like material and velvety adhesions extended upwards over the upper surface of the liver, between it and the diaphragm. The large rounded lower end of the cyst, free from adhesions, dipped down in front of the uterus. At the back of the cyst, some distance above this lower end, a broad membranous pedicle, running vertically upwards, attached the cyst to the left side of the uterus. The uterus contained an interstitial fibroid as large as a tangerine orange in the fundus, and a second one in front of the right cornu, forming a prominence as large as a walnut. The cyst was extremely delicate, so that it broke up very much during delivery; at the same time large masses of the jelly-like substance were ladled out of the peritoneal cavity with the hands. The pedicle was tied with silk, and the peritoneal cavity washed out with 3 gallons of normal saline solution, large quantities of the jelly being thus washed out. The right tube and ovary were examined and found to be healthy. After the flushing the walls of the intestines were seen to be red, and covered extensively with delicate fluffy, adherent flakes. The abdominal incision was closed by deep silkworm gut sutures, with a layer of interrupted catgut sutures to the fascia. Recovery was uneventful. The incision healed by first intention, and the sutures were removed on the twelfth day.

Seven years later, on September 24, 1912, the patient wrote saying she was quite well.

The cyst was made up of a very large number of elongated loculi with extremely thin transparent walls, in which vessels ramified. The loculi varied in size up to that of a bean or a pigeon's egg. The portion collected weighed 16 lb. The Fallopian tube was normal, and the mesosalpinx free.

Under the microscope the loculi were seen to be lined by a single layer of typical high cylindrical, secreting, pseudomucinous epithelial cells. The parietal peritoneum showed signs of œdema, with loss of surface epithelium. Collections of the gelatinous material distended some of the lymphatic vessels, but there were no epithelial metastases.

Case V.—Pseudomyxomatous peritonitis due to rupture of gelatinous left pseudomucinous ovarian cyst with a dermoid loculus; uterine fibroids; exploratory tapping; abdominal removal of uterus and both appendages; well after more than two years.

A single woman, aged 38, was operated upon on December 24, 1909; she was a patient of my friend Dr. Ambrose Palmer, to whom I am indebted for many of the following details. The patient had given up work as a parlourmaid in May, 1907, because of an ulcer in the mouth and general weakness.

The ulcer was on the inner side of the lower lip, and was suspected to be specific; mercury had no effect, and it quickly healed under applications of caustic. Swelling of the feet was first noticed eleven months ago, and gradual swelling of the abdomen for nine months. There have been slight dyspnœa and sleeplessness, but no albuminuria and little or no pain. The patient was first seen by Dr. Palmer at the end of November, 1909, on account of a large abdominal swelling. Three days before I saw her the abdomen was tapped with a trocar and cannula, but only a little cheesy material came away in the end of the cannula, and a second puncture also failed to withdraw any fluid. The catamenia have been regular since 13 years of age, lasting a week every month, with much loss, and for the last eight or nine years the passage of clots: there has sometimes been pain. The last regular period occurred at the end of November. The family history is good.

There was a large anterior prominence of the abdomen, due to a firm, elastic tumour, ill-defined in its upper part. There was a free thrill all over; resonance to percussion above and in the flanks. On vaginal examination the cervix was high up to the right, nearly at the level of the pelvic brim; a soft, elastic, rounded mass was felt above the left posterior quarter of the pelvis.

On December 24, chloroform being administered by Dr. Clement Palmer, and Dr. Ambrose Palmer assisting, a median lower abdominal incision was made with the patient in the horizontal position. Two gallons of clear yellowish, gelatinous material were lifted and pressed out of the peritoneal cavity, which was filled from the bottom of Douglas's pouch to the liver. In the neighbourhood of the abdominal puncture the material was mixed with a little blood-clot. The body of the uterus, displaced into the right iliac region, was regularly rounded and as large as a coconut. The left broad ligament was opened up by a large cyst of the ovary with very many loculi with thin walls; the tube was elongated and passed upwards and to the left in front of the tumour; the cyst was very closely adherent to the transverse and descending colon, and to the mesocolon: not to the omentum. The right appendages were covered by the adherent gelatinous mass, but otherwise normal. The uterus was removed entire, together with the right appendages and the left cyst; much difficulty was experienced in getting clear of the lower part of the cyst, which had extended downwards deeply between the layers of the broad ligament. The peritoneal cavity was flushed with about 2 gallons of warm saline solution, many large masses of the jelly-like material escaping. The peritoneum covering the intestines and the anterior abdominal wall was thickened, roughened, and matt, with a shaggy, velvety, reddish-grey surface.

Parts removed: The uterus measures $5\frac{1}{2}$ in. by $3\frac{1}{2}$ in. by 4 in., the enlargement being due to an interstitial fibroid as large as a cricket ball in the fundus and anterior wall; the tumour shows some mucoid degeneration. Two small subperitoneal fibroids are present in addition. The peritoneal surface of the uterus is covered by dense membranous and band-like adhesions, among which are several small encysted collections of fluid. The endometrium is thickened, but otherwise normal. The portion of left ovarian cyst examined measured $5\frac{1}{2}$ in. by $5\frac{1}{4}$ in. by 4 in.; it is composed of a large number of small loculi with delicate, transparent connective tissue walls, and filled with jelly-like material. The outer wall of the main loculus is fibrous and shows an extravasation of blood into the middle connective tissue layer where it was tapped before the operation. At one part is a loculus the size of a hen's egg with thick, opaque connective tissue walls, filled by sebaceous material and with a skin-like lining; no dermoid papilla can be demonstrated. The Fallopian tube, slightly elongated, is congested, adherent to the surface of the cyst, but otherwise normal. With the exception of the hæmorrhage above described in the main wall of the ovarian cyst there is no sign of degeneration. The right appendages, except for the remains of adherent material on the surface, are normal, and call for no special description.

In a letter dated September 5, 1912, Dr. Palmer informs me that the patient keeps well.

Case VI.—Left ovarian pseudomyxoma; omental cake; encysted collections in abdominal wall and at the ileo-cæcal junction; operation; smooth recovery.

A married lady, aged 74, who had borne thirteen children, was referred to me by my friend Dr. Farmer, of Ludlow, on November 7, 1911. The daughter of the patient had called the doctor's attention to her mother's abdomen because of its increasing size; there had been no pain or other complaint; the patient was well preserved, plump in the face, but getting thinner elsewhere. Dr. Farmer had attended the patient for influenza nine months before and there was no tumour in the abdomen at that time. The menopause had occurred at 50, and there had been no subsequent discharge. The urine contained a haze of albumin; the thoracic physical signs were normal, the pulse and arteries good. The abdomen was pendulous, and there were enormous varicose veins about the mons veneris and lower part of the wall. A large, firm, elastic, uneven cyst of the ovary was present with its long diameter transverse; the cervix was high up posteriorly, the lower part of the cyst being just reached in front above the level of the pelvic brim.

On November 22 a 6-in. median longitudinal incision extending upwards to 2 in. above the umbilicus was made through the 2-in. thick abdominal walls, and displayed a large multilocular cyst with the omentum broadly adherent at its upper end. The cyst had perforated at several places in the fundus and posterior wall, and thick, transparent, colourless gelatinous material was escaping into the peritoneal cavity; some ounces of similar material were present at the lower part of the cyst in front. A large trocar was introduced and two or three pints of the tenacious material flowed through it with difficulty; the cyst was composed of a very large number of small and medium-sized loculi; it was broken up by the hand and delivered. A long, typical ovarian pedicle came from the left broad ligament and was secured and divided $1\frac{1}{2}$ in. clear of the growth. The right ovary was atrophied, the size of an almond kernel; the uterus elongated and somewhat large for a patient aged 74. The omentum at its distal end and for a length of 4 in. and a breadth of 4 to 5 in. was stiff and thickened with adherent jelly, and was removed. A portion of peritoneum from the anterior abdominal wall was removed for examination, and in doing so it was observed that there was a firm mass of about the size of a walnut in the subperitoneal tissue below and to the right of the umbilicus; this proved to be a mass of similar gelatinous material to that in the abdominal cavity contained in a smooth-lined cavity with a small opening internally about 1 mm. in diameter; a part of the abdominal wall including this thickening and the umbilicus was excised. The peritoneal cavity was flushed out with saline solution, a large quantity of gelatinous fluid being washed away. Another mass of the jelly, the size of a walnut, was then found burrowing under the peritoneum on the posterior aspect of the junction of the cæcum and ileum; the bulk of this was removed, but it was impossible to remove the whole of the attached base. The abdominal incision was finally closed as usual in layers. The operation had lasted an hour and was well borne. Recovery was uneventful, and the incision healed by first intention. From the fourth to the sixth day after operation there was a slight red vaginal discharge.

Parts removed: Of the gelatinous mass 7 pints were measured, but in addition a very large quantity was washed out of the cavity: it gave the chemical reactions of pseudomucin. The portion of cyst removed weighed $3\frac{1}{4}$ lb. Two definite breaches of the surface were made out, one at the distal pole, 4 in. in length, was traumatic, at least in part; near this a perforation measuring $\frac{1}{2}$ in. in diameter had smooth round edges. The surface of the cyst was smooth and free from adhesion; the wall is extremely thin in places, especially near the second aperture above described. The colour of the tumour is greyish-white with darker bluish areas: large veins course over the surface, and even over the extremely thin walls of the translucent areas small vessels can be seen. On section the growth is shown to be formed of a congeries of large and small cysts varying in size from a pea to a large orange. The contents of the larger cyst have escaped, but the dense tenacious material forms a layer on the inner aspects of the loculi, and the smaller loculi are filled with semi-solid translucent greenish-grey material. This material in several places has eroded the wall of the cyst and bulges on the surface, bounded by the finest possible transparent membrane. No intralocular growths are present, and there are no signs of degeneration or hæmorrhage. The Fallopian tube, 4 in. in length, is closely attached to the surface of the cyst and appears normal. the mesosalpinx has been obliterated by the growth of the tumour.

DISCUSSION.

Dr. ANDREWS gave a brief account of a case that had been under his care. The patient was aged 49, and was first seen in July, 1904. She had had enlargement of the abdomen for twelve months, with rapid increase in size for the last three months. There had been a sharp attack of pain lasting for seven days, about three weeks before she was seen. There was evidence of free fluid in the abdomen, and a tumour, the size of a large orange, on the left side of the uterus. A large quantity of gelatinous matter, about 6 pints, was removed. A pseudomucinous cyst, unruptured, was removed from the left side, and a collapsed ruptured cyst removed from the right side. A growth, 3 in. long by 1½ in., was found in the wall of the cæcum. This was removed after the peritoneum over it had been incised. A small opening made in the lumen of the cæcum was sewn up. In August, 1905, the abdomen was opened again, and a large quantity of jelly, which seemed to be growing from the right side of the pelvis, was removed. In November, 1905, a large quantity of gelatinous material was again removed. There were many adhesions between intestine, uterus and bladder. The uterus was removed together with as much as possible of the broad ligament. In August, 1906, 7 pints of gelatinous material were removed. The jelly was enclosed to a large extent in tissue resembling the wall of a cyst. Pieces of jelly were found growing in the intestinal wall and in the mesentery. In January, 1907, a small quantity of rather solid jelly was removed. It was found to be more tenacious and more difficult to remove than before, and intestinal adhesions were becoming more troublesome. In June, 1907, a large amount of jelly was removed. Adhesions between intestines, bladder and abdominal wall gave a good deal of trouble. In separating adhesions the small intestine was opened. As the jelly seemed still to have its chief point of origin in the right side of the pelvis, a large quantity of gauze was packed into what might be called the jelly-producing cavity, in a rather hopeless attempt at obliterating this cavity. In February, 1908, the abdomen was opened for the seventh time. The patient's general health was not nearly so good as before. On account of the pain, bearing-down sensation, and feeling of pressure complained of by the patient, Dr. Andrews operated, rather against his will. A large amount of gelatinous material was removed from the right side of the pelvis, and a large greyish-white mass removed from the mesentery. The intestinal walls were very soft and friable, and gave way in two places. A portion of two adherent coils was excised, but there did not seem to be much chance of sutures holding. The patient died on the third day from peritonitis. The seventh operation was performed a little over three and a half years after the first one. Microscopically no true epithelial metastases could be found, although the jelly itself had infiltrated the tissues.

Dr. HERBERT SPENCER had met with several cases of pseudomyxoma peritonei from ruptured ovarian tumour, which in one case had dermoid contents. The most interesting of the cases was that of a lady who had been supposed by a German doctor to have an accumulation of abdominal fat, and had been advised to take plenty of exercise, and had been massaged. The patient made the shrewd observation that it was strange that she should have so much fat in the abdomen and be so emaciated in the face and limbs. As the abdomen increased in size the patient came to England, and presented the signs of a very large ovarian tumour with a very indefinite outline and clearly fluctuating. He thought it was probably ruptured. He had operated on this patient three times during the past eight years, removing 3 gallons of greenish colloid material from the peritoneum and a ruptured ovarian cyst on the first occasion, and a smaller quantity a year later, at which time there was also a secondary growth in the hepatic flexure of the colon, which he did not interfere with. On the third occasion he removed a still smaller quantity, and could find no remains of the tumour in the upper colon, but found a cystic tumour in the sigmoid colon, which he evacuated. Since the third operation more than three years had elapsed, and the patient has remained quite well. Dr. Spencer asked Dr. Wilson whether the beautiful photographs exhibited were from tumours which had burst and produced typical pseudomyxoma peritonei. His own impression was that in these cases the epithelium was usually simple columnar epithelium, not thrown into the tufts of goblet-cells distended with secretion as shown in Dr. Wilson's photographs. Like others, he had held the opinion that the colloid material was secreted by the epithelial cells, a view supported, he thought, by its occurrence in disease of the appendix; but at the recent International Gynæcological Congress in Berlin Dr. Nagel had exhibited a specimen which he considered showed its origin in degeneration of the cyst wall; and he was sure that all gynæcologists, knowing the high value of Dr. Nagel's work, would give his view their serious consideration.

Dr. EDEN said he would like to mention a case he had recently had under observation, in which cystic dilatation of the vermiform appendix was also present. The patient was a married woman, aged 46, who had never been pregnant, and on August 19, 1908, he removed a ruptured colloid cyst of the left ovary. There was a great deal of colloid material adherent to the peritoneum, and the peritoneal cavity was flushed with normal saline solution. The right ovary was not enlarged and was not removed. On December 9, 1910, a second operation was performed and a similar cyst of the right ovary was removed. The vermiform appendix was dilated cylindrically in its peripheral three-fourths, and after removal was found to contain colloid material precisely similar to that in the ovarian cyst. The condition of the vermiform appendix at the time of the first operation was not noted. The patient had been quite well since the operation.

Dr. THOMAS WILSON, in reply, emphasized the variations in degree of malignancy of this condition. Where the peritoneal cavity was found occupied by jelly-like material the most common primary seat of the disease was found in an ovarian cyst, which, in its pathological characters, entirely resembled the ordinary simple glandular ovarian cyst, except in the nature of the contents. In a minority of cases the ovaries were found to be healthy and the condition originated in a cyst of the vermiform appendix. The term "colloid cancer" had been used for this condition but it was not justified. Dr. Wilson had hitherto met with no case of colloid cancer of the peritoneum and was convinced of the extreme rarity of such an affection, even if it existed at all.

Obstetrical and Gynæcological Section.

November 7, 1912.

Dr. Amand Routh, President of the Section, in the Chair.

Case of Puerperal Eclampsia treated by Cæsarean Section.

By R. Drummond Maxwell, M.D.

Clinical History of Case.

E. S., a young primigravida, aged 19, was admitted to Queen Charlotte's Hospital at 9.35 a.m. on July 23, 1912. Patient had been seen two months previously in the Out-patient Department, and her estimated date of onset of labour was July 25, 1912. No suspicion of toxæmia was aroused at this time. Patient was brought to the hospital in a cab and was fully conscious on admission. There was a history of three fits at home since 8 a.m. the same morning, and one transient fit occurred in the cab, making four in all prior to admission. Œdema of the legs was marked; there was no œdema of the vulva or abdominal wall. Slight puffiness was noted in the face. The earliest report of the condition of the urine obtained by catheter between the fifth and sixth fit showed little more than a faint cloud of albumin (Esbach, 0·05 per cent.). The reaction was acid; neither acetone nor diacetic acid was present. The blood-pressure stood at 165 mm. Patient was having "weak pains" about every twenty minutes. The presentation was left occipito-anterior. The fœtal heart-sounds were regular and strong. *Per vaginam* the cervix was not "taken up." The canal was rigid and only admitted the tip of the index-finger.

11.15 a.m.: I saw the patient for the first time, and in view of her good general condition decided to adopt an expectant attitude for a few hours to estimate the progress of her labour, and form a prognosis on the severity of her toxæmia. Treatment was limited to mag. sulph. and castor oil by mouth and hot packs and saline solution *per rectum*.

10.30 a.m.: One hour after admission a fifth fit occurred; its duration was about five minutes. Consciousness was quickly regained.

12.40 p.m.: The sixth fit occurred; consciousness was regained almost immediately.

1.45 p.m.: Vaginal examination. The cervix was "taken up" but dilatation of the canal had not progressed. The os did not admit more than the tip of the index-finger.

2.15 p.m.: The seventh fit occurred.

2.30 p.m.: The eighth fit took place. Patient regained consciousness rapidly after both these fits.

3 p.m.: The ninth fit occurred, lasting about ten minutes. Patient did *not* regain consciousness after this fit.

Fits now recurred at 4.15, 4.55, 5.20 and 6 p.m., when the thirteenth took place. Patient had not regained consciousness since the ninth fit at 3 p.m.

I saw the patient for the second time at 6.30 p.m. During the afternoon two pints of saline solution had been injected *per rectum*. Examination *per vaginam* showed that in spite of intermittent contractions of the uterus, practically no progress had been made in cervical dilatation, the cervix just admitting the index-finger. Calculating on ordinary grounds that such a labour (apart from the toxæmia) would not terminate till at least another twelve hours, and influenced by the fact that coma was deepening while the patient's pulse still remained relatively strong, I decided to perform Cæsarean section as soon as possible. That the fœtus happened to be alive and its heart sounds regular and strong did not influence me in the least in arriving at this decision. I should like to emphasize this point especially. The operation was performed to end what most of us believe to be a placental toxæmia, and was carried out solely in the mother's interest. If considerations of the fœtal factor be allowed to weigh at all in this matter, then there must be an unconscious bias in favour of a surgical termination of the labour, which can only discredit Cæsarean section as a means of treatment. That the child happened to be alive and survived the operation I regard as exceedingly fortunate and an altogether rare coincidence, since, in the majority of the cases where Cæsarean section may have to be discussed, the fœtus will either be gravely imperilled or have died *in utero.* I should still have carried out the operation even in the face of clear evidence that the fœtus was dead.

A few points may be mentioned in connexion with the operation. Ether anæsthesia was adopted and no fits occurred during its administration. It is interesting to note that in the case recorded by Dr. McCann, where he operated in a private house, a fit occurred during the operation. The anæsthetic used was chloroform, probably the only anæsthetic at the doctor's command; but this incident is instructive since it serves to emphasize the risks of an additional toxæmia due to the chloroform, and that such risks were not worth running, since the saturation of the patient's tissues with chloroform had clearly no effect in controlling the fits. Probably, however, the anæsthesia was not pushed to surgical limits. On incising the uterus layer by layer, the bag of waters, unruptured, stood out in the wound as an emerald-green bulging tumour, showing that, in spite of vigorous heart sounds, some degree of fœtal embarrassment was already present and meconium being freely passed *in utero.* The child cried vigorously from the first and thrived well. The uterus was allowed to bleed as freely as possible, that is, no steps were taken to ensure firm contraction by the usual means of firm pressure with hot towels wrung out of saline solution. Before closing the abdomen two pints of normal saline solution with 10 per cent. of glucose were poured into the belly.

8.40 p.m.: One hour after the operation, as patient was very restless, a subcutaneous injection of morphia ($\frac{1}{4}$ gr.) was given, the only dose of morphia the patient received. This was not given to exert any specific effect, but purely out of regard for the patient's abdominal wall.

No subsequent fits took place, and the mother made an uninterrupted apyrexial recovery. Thirty-two hours after the operation the patient became rational, asked where she was and what had happened to her; not till the subcuticular silkworm-gut stitch was removed on the twelfth day was the patient aware that delivery had not taken place by the natural passages. A considerable drop in the patient's blood-pressure set in after delivery, from 165 mm. Hg. to 125 mm. Two days before her discharge the blood-pressure was estimated at 135 mm. Albumin, which had never been present in more than a faint cloud, disappeared entirely by the third day.

INDICATIONS FOR THE OPERATION.

The indications that I would formulate for Cæsarean section in these circumstances are :—

(1) Fits occurring in a primigravida.

(2) Onset of fits with no signs of the start of labour.

(3) A rapid succession of fits, where consciousness is not regained and coma is deepening.

(4) Failure of advance of cervical dilatation after several hours of an expectant attitude, with the prospect of many hours' delay before the second stage of labour is reached.

(5) Absence of any definite signs of improvement after several hours "eliminative" treatment has been carried out.

The existence of several of these indications in a given case is not sufficient to warrant Cæsarean section, but the presence of all five constitutes a case of such gravity as to render the operation, in my opinion, justifiable.

The higher mortality of eclampsia in the primigravida, to whatever its cause be due, either to the greater length of the labour or more probably the lack of "immunization" of her blood by a previous pregnancy, places her in a category apart from the multipara, in whom the toxæmia is on the whole less grave and the cervix more responsive to artificial means of dilatation. That fits, solely *post partum*, may occur and prove fatal has been used as an argument against a hurried delivery, and has perhaps influenced one too strongly against expediting the labour. In spite of these cases, most of us will agree to the practically constant amelioration of the mother's general condition *post partum*. I do not think in the gravest cases this possibility of *post partum* fits should deter one from carrying out Cæsarean section.

Is Cæsarean section going to add materially and seriously to the mortality of eclampsia? I think on this point one can confidently affirm that it will not do so. Dr. Amand Routh's valuable collection of Cæsarean statistics showed us that the mortality of the "clean" Cæsarean operation was as low as 2·9 per cent. I fail to see how an operation with this low rate of mortality, and capable, I believe, of further improvement in skilled hands, can influence to any great extent the eclamptic mortality. This is not to recommend Cæsarean section as the infallible treatment of the grave case. Surroundings must be propitious and the operator skilled in the technique of the operation. Of the major abdominal operations, Cæsarean section is notoriously devoid of shock. Can we say the same of alternative procedures—the manual dilatations of the cervix so useful in the multipara, so useless in the primigravida—instrumental dilatations, vaginal Cæsarean sections, the intra-uterine manipulations such as version, even apart from trauma of the genital tract? I think not.

I cannot conclude these remarks without a reference to a communication made by my colleague, Dr. McCann,[1] on this subject in May, 1910, at the Royal Society of Medicine. The paper provided a valuable discussion as to the position of the operation in relation to eclampsia. Briefly, the summary of that discussion established the principle that while the indications must be excessively rare, yet precisely as with desperate cases of central placenta prævia and accidental hæmorrhage, the operation occupies a definite place in the treatment. Individual opinion must always vary as to what degree of severity of symptoms constitutes an indication for this surgical termination of labour. Where roughly 85 to 90 per cent. of the patients recover from this disease, advocates of this policy must always lay themselves open to the criticism that less heroic methods might have been attended with an equally favourable result. The only sure ground is the accumulation of records of cases so treated where the indications are clearly stated and open to discussion and criticism. It is in this hope that I have made this communication.

DISCUSSION.

Dr. TATE had recently seen a severe case of eclampsia in a primipara in consultation with Dr. John Phillips. The condition was associated with glycosuria (20 gr. to the ounce). Owing to the grave condition of the patient and the fact that the cervix was much elongated and not dilated, it was agreed that Cæsarean section offered the most rapid and safest means of delivery. The operation was successfully carried out by Dr. Phillips, and although her condition was a source of grave anxiety for three days, she made a good recovery. The child also was strong and healthy. There could be no doubt that in certain selected cases where the cervix was not dilated and the condition of the patient called for rapid delivery Cæsarean section was the safest method to adopt both for the mother and child.

Dr. BLACKER thought it was difficult to justify the performance of Cæsarean section in cases of eclampsia in view of the bad results which had attended this operation in the cases published. Further than this, it was difficult to see what advantage was gained by it beyond the removal of a possible source of reflex irritation. Dr. Maxwell had laid down certain conditions in which he considered this operation was called for, but the case he had related did not seem entirely to fulfil those conditions. Judged by the clinical details given, Dr. Blacker could not agree that the case, at any rate when first seen, was a severe one of eclampsia; the amount of albumin was small, the fits were not very frequent, and the comatose condition did not supervene until some time after the woman had come under observation. He wished to ask Dr. Maxwell why he had not resorted to any of the ordinary methods of sedative treatment to control the fits, as the treatment he had adopted could not be expected to have much effect in this direction. Apparently the cervical canal had been taken up, but there was some spasm of the external os, a spasm which in all probability would have yielded to the administration of chloral or chloroform, or if these had failed the case was a most suitable one for the use of Bossi's dilator, indeed, exactly the type of case in which this mode of dilatation gave good results and was safest to carry out. In his opinion, it was impossible by any operative procedure to improve on the results obtained by the expectant treatment of eclampsia, which had been employed by Stroganoff in 360 cases with a maternal mortality of only 6·6 per cent., and by Tweedy in 66 cases with a mortality of 9 per cent.; while Roth had recently published 31 cases treated in Dresden by Stroganoff's method with only one maternal death. He did not think that Cæsarean section could be justifiable except in the very rare cases in which it was necessitated on other grounds, when they remembered that among the 34 cases collected by Hammerschlag the maternal mortality was 55 per cent. According to J. F. Moran,[1] 116 cases in all had been recorded in the literature with a maternal mortality of 18·9 per cent. and a fœtal mortality of 39 per cent. He had collected 53 cases of Cæsarean section performed during the years 1901 to 1911 for eclampsia, with a maternal mortality of 32·3 per cent., and a fœtal mortality of 19·9 per cent.

---

[1] *Proceedings*, 1910, iii, pp. 193-207.

Mr. CLIFFORD WHITE asked Dr. Maxwell whether anasarca was a marked feature. He had seen several cases in which the presence of anasarca had made treatment by the usual medicinal methods unsatisfactory. Transfusion was not a success if the patient was already waterlogged; morphia in large doses was undesirable if œdema of the lungs was present, and gross œdema of the vulva rendered operative measures *per vaginam* difficult and tended to cause sloughing. He suggested that the presence of anasarca might be added to the other points that Dr. Maxwell had mentioned as together forming an indication for Cæsarean section.

The PRESIDENT (Dr. Amand Routh) thought that we were not yet in a position to lay down the exact cases in which Cæsarean section should be performed in puerperal eclampsia. Clearly it should not be the treatment

---

[1] *Trans. Southern Surg. and Gyn. Assoc.*, Washington, 1912, xxiv, p. 121.

"at the first fit," as suggested by Dührssen and Bumm, nor should it be done when the patient was *in extremis*. It should, therefore, be done only in cases apart from these two conditions, and always after other less radical methods of treatment had been first tried. He was surprised that Dr. Maxwell attached no importance to the child being alive as an indication for Cæsarean section, although he considered the case to be one of placental toxæmia. Surely, if so, the death of the child *in utero*, or the artificial removal of the fœtus, would arrest the placental circulation and lessen the toxæmia. If it was decided to deliver the fœtus, there was no more rapid or safe method in a "clean case" than Cæsarean section.

Mr. W. J. MIDELTON said he could call to mind three cases of puerperal eclampsia that had occurred in his practice. The first was a multipara who had been in labour about twenty-four hours under the care of an aged practitioner who had adopted a rigid expectant attitude at first, but eventually sent to him (Mr. Midelton) for aid. By that time the patient was very œdematous all over, comatose, and having frequent convulsions. Chloroform was administered and twins delivered with forceps. The patient made a good recovery. The second was a primipara, neither œdematous nor comatose, but frequently convulsed. Morphia was first given, then chloroform. The fœtus was delivered with forceps. The patient recovered well. The third patient was comatose, frequently convulsed, and somewhat œdematous. Morphia was administered and the child was born naturally, but the patient died. It was subsequently discovered that she had been badly knocked about during a brawl shortly before. Mr. Midelton thought the administration of thyroid extract, as soon as circumstances were discovered likely to lead to eclampsia, might help in preventing its occurrence. He was not opposed to Cæsarean section in suitable cases, as it was quickly performed and the bleeding entailed tended to reduce toxæmia.

Dr. GRIFFITH said that the question of delivery by Cæsarean section in cases of puerperal eclampsia was not one which was to be easily decided. He could readily understand the tendency on the part of a surgeon to perform this operation in the severe cases as an alternative and safer treatment than forced delivery. The risk in the hands of a competent man should be less to both mother and child, and if this view was placed before the husband and friends, he could understand their ready acquiescence. He could not accept as at all conclusive the statistics quoted by Dr. Blacker, in which the mortality of 60 per cent. was stated to be the result of the operation in these cases. It would require a very careful analysis of the cases and post-mortem examinations to enable us to say how far the results were due to the disease, and how far the operation was responsible for the high mortality. When we realized the extensive changes in the kidneys, liver, the meninges, and sometimes the substance of the brain, it must be admitted that there must be a certain proportion of cases in which no treatment at present known to us could be available to save life.

Dr. EDEN said he was quite prepared to admit that Cæsarean section might find a recognized place in the treatment of bad cases of eclampsia. A certain number of cases were absolutely resistant to eliminative treatment, and either occurred before labour had begun, or were associated with complete arrest of the process. But the difficulty practically was to recognize these cases in time. If many valuable hours were spent in unsuccessfully attempting to relieve the toxæmia by palliative treatment, the patient's condition deteriorated so much that when Cæsarean section was ultimately resorted to the circumstances were most unfavourable for success. We badly needed some additional clinical data as to what constituted a really serious case, without waiting for large numbers of fits to occur, or for deep coma to develop.

Mr. WYATT was under the impression that Professor Bumm, Berlin, had published a record of 150 cases of eclampsia treated by "abdominal" or vaginal Cæsarean section with a mortality of 5 per cent. The President stated that Bumm operated on cases when they had only had one fit. Mr. Wyatt replied that he imagined expectant treatment was started after the patient had had one fit.

Dr. ROBERTS said he came to the meeting very much opposed to the idea of treating eclampsia by Cæsarean section, but that Dr. Maxwell's careful account of a case in which this operation seemed necessary had led him to see that in very exceptional cases such a proceeding seemed justifiable. Dr. Roberts thought that it was by reporting cases of this kind that one was led to change of attitude towards the treatment of this disease, in spite of the fact that up to the present he felt strongly with Dr. Blacker and others that medical treatment should be fully tried before resorting to operation. Much surely depended on the view taken by an individual operator as to the pathology of eclampsia, and whether emptying the uterus was or was not efficacious in stopping the convulsions or relieving the toxæmic condition; if it was efficacious, then Cæsarean section was justifiable in certain cases. As to the gravity of the symptoms which might lead one to interfere, besides deep coma, many convulsions, or great œdema, he would like to point out that he considered a rising temperature, perhaps reaching 104° or 105° F., of very grave import in this condition.

Dr. MAXWELL felt gratified that his paper had provoked such an interesting discussion. He was well aware before he read the paper that considerable opposition would be raised to the treatment, but he hardly thought one of the grounds for that attack would be that the case was not of sufficient severity to warrant Cæsarean section. Dr. Maxwell still held that the presence of all five of the indications he had quoted, associated in a particular case, constituted an extremely grave form of eclampsia. Some speakers (including the President) had thought that a more detailed account of such medical treatment as had been carried out should have been given: others had expressed the view that no effective medical treatment whatever had been adopted. Dr. Maxwell admitted that no narcotics or sedative drugs had been given, and that for several reasons. In the first place he could never convince himself that the administration of morphia—a drug one of the chief functions of which was to arrest metabolism—was anything but the most symptomatic treatment directed against fits alone; in the second place, as a matter of scientific interest, what would the value of the case have been (and there were only three or four in our British literature) if the patient had first had narcotics and sedatives, and then undergone Cæsarean section? Dr. Blacker would have been the first to attribute the recovery to the morphia, and would unsparingly have condemned the method of delivery. As regards the medical treatment the patient had, Dr. Maxwell held that the washing out of the stomach and bowel, the free purgation and diaphoresis, entitled him to say that "eliminative" treatment had been carried out conscientiously, and yet here was a patient steadily going from bad to worse. Why should he wait till she was *in extremis* before delivering her? Dr. Blacker had referred to the possibility of using Bossi's dilator, an instrument which in his (Dr. Blacker's) hands had given good results. Dr. Maxwell regretted that his experience of the instrument was *nil;* he had never been encouraged to use it by his seniors, had never seen it used, and had always therefore felt that his theoretical objection to it was quite unscientific. He hoped later to have opportunities of testing the instrument. Dr. Blacker had expressed the hope that the case would not be published as having the imprimatur of the Obstetrical Section. Dr. Maxwell felt certain that this impression would not arise, for, after all, there were too few cases to decide the point on—McCann's case, several cases in Edinburgh, and his own; but he hoped there might be an increasing number of cases submitted to the Society—which would place the indications for Cæsarean section on a firmer footing.

A Case of Simultaneous Intra-uterine and Extra-uterine Pregnancy, with probable "Internal Wandering" of the Ovum.

By H. Russell Andrews, M.D.

Patient, aged 29, was sent up to the hospital on September 20 by her medical attendant with a diagnosis of early miscarriage, following perforation of a gastric ulcer. On September 19 she lost a large amount of blood *per vaginam* and passed a small embryo, seen by the nurse but not by the doctor. The nurse was certain that no placental tissue had been passed. She had been married five years, and had two children, the younger two and a half years ago. Three days before admission, while out shopping she had a sudden attack of violent pain all over the lower part of the abdomen, like labour pain. She vomited and felt faint. The pain went away for a short time, but returned and continued with vomiting up to the time of her admission. Catamenia: The last period ended on July 9. After this there was no loss until the day on which the pain began, September 17.

The patient was blanched, and was evidently in severe pain. The pulse was 130 per minute. The abdomen was distended, rigid, tender and painful. The cervix was dilated enough to admit a finger-tip; no blood was coming away. Owing to the distension of the abdomen it was impossible to estimate the size of the uterus bimanually. The patient having been anæsthetized, the cervix was dilated with Hégar's dilators, and the finger passed in. The greater part of an ovum of about two months was removed with ovum forceps, and a hot intra-uterine douche was given. The abdomen was then opened, and found to contain a large quantity of blood. The left ovary and tube were found to be normal, but on the right side no ovary or tube could be found. At the right cornu of the uterus was a rupture making a rough surface about the size of a shilling, attached to which was a mass of blood-clot containing a small embryo. The cornu was excised, and the wound sewn up with catgut. The uterine cavity was not encroached upon by the wedge-shaped incision. A careful search failed to reveal any trace of the right tube or ovary. The round ligament on the right side was normal. There was a fold of peritoneum running from the pelvic brim to the back of the uterus rather than to the cornu, and there were some filamentous adhesions, but there were no adhesions of sufficient density to make it difficult to distinguish the nature of the structures. Projecting from the left ovary were two firm, round, yellowish bodies, each about an inch in diameter, suggestive of very small dermoids. I excised one of these, and found that it was an unusually firm corpus luteum.

For three days after the operation the temperature was 102° F. There was a good deal of dyspnœa, and there were signs of consolidation at the base of the left lung. The temperature came down by lysis and became normal on the twelfth day after the operation. The wound healed by first intention.

This case is interesting from two points of view: (1) The presence of co-existent intra- and extra-uterine pregnancy; this, though not common, is still not very rare. (2) The presence of interstitial pregnancy on the right side in the absence of a right tube.

If my opinion as to the condition of the right side of the pelvis is correct—that is, that there was no trace of ovary or tube, an opinion shared by Dr. Gordon Luker, the Registrar, and by my Resident Accoucheur—this case must be looked on as one of "internal wandering" of the ovum. Cases in which "internal wandering" of the ovum has been proved to have occurred are rare. Wyder[1] recorded a case in which he considered that there was definite proof of this occurrence. The ovum was situated in the middle of the right tube, the distal part of which was considerably dilated, the fimbriated extremity was closed, no trace of fimbriæ could be found, and there was no ripe follicle in the right ovary. He quotes cases recorded by Schultze and Hassfürther in 1863.

---

[1] Wyder, "Beiträge zur Lehre von der Extrauterinschwangerschaft, &c.," *Arch. f. Gyn.*, Berl. 1886, xxviii, p. 362.

A Small Ovarian Teratoma containing Brain and well-formed Intestine.

By H. Russell Andrews, M.D.

M. Z., aged 29; six children, the last one year ago. Complained of pain in the lower abdomen; thought herself two months pregnant. There is a tough-walled cyst lying behind the uterus, probably an ovarian dermoid. Admitted on May 10. Operation May 13. A tumour of the right ovary, the size of a tangerine orange, was removed. The left ovary contained a simple cyst smaller than the tumour of the right ovary. It was also removed. The tumour of the right ovary contained hair and fatty matter, and also a tubular structure about 4 in. long and 1 in. in diameter, closely resembling intestine, coiled on itself, attached to the wall of the cyst by a structure resembling mesentery.

Description of the cyst after hardening: The cyst, which has a narrow pedicle about 1 cm. across, measures about 5 cm. in diameter. Its outer surface is smooth and white with a few white thickenings on the peritoneal surface. Inside the cyst there is a quantity of sebaceous material and some hair. The wall of the cyst is for the most part smooth and white. An area about 5 cm. in diameter is occupied by the following structures: (1) In the centre is a nodule 1·5 cm. by 1 cm., having a smooth, slightly convoluted surface of yellowish colour and suggesting brain; (2) encircling this is a rounded ridge which has a pitted, white, epidermal surface from which sprout numerous black hairs; (3) from one extremity of this ridge there rises a tubular structure which projects into the cyst but is attached by a mesentery. This tube is about 5 cm. long and 1·5 cm. in diameter. Its free end is coiled. Its surface is smooth. On section it shows a thin wall and a core composed of a homogeneous yellow material somewhat like almond icing. At the base of this tube the knife strikes bone.

(1) Section through epidermal ridge and "brain": One portion shows a well-developed epidermis with large hair-roots and groups of sebaceous glands in the subjacent dermis. At a somewhat deeper level than the sebaceous glands there are groups of wide sweat-glands. They are lined by a single layer of large cubical or short columnar cells, which have an abundant purple granular protoplasm; beneath this there is a layer of spindle cells which are directed in the long axis of

the tubes; this layer appears to be incomplete. The epidermis and dermis shade off to a narrow layer of flattened cells on a narrow zone of fibrous tissue over the other portion of the section. This consists of a quantity of nerve-tissue in which there are glia cells with an abundant network of fibrils. There are also numbers of nerve cells of various shapes and sizes. The nerve-tissue is well supplied with blood-vessels, and also shows some tubular portions of neural canal lined by small cubical epithelial cells. Around the canal there are solid groups of similar cells. From the surface of the nervous tissue a nerve-root passes beneath the narrow layer of epidermis and dermis. It has a fibrous sheath and passes to a large ganglion.

(2) Transverse section through the tube: The large tube-like structure shows a narrow outer shell of gut wall, the central solid-looking part consists of mucoid and granular débris. The gut wall has a flattened mucosa lined by a single row of tall columnar cells with numerous goblet cells. There are a few glandular crypts. The mucosal connective tissue contains a good many eosinophile cells and some groups of lymphocytes. The muscularis mucosæ is well formed. The submucosa is narrow. It shows a few vessels. The muscle shows both circular and longitudinal coats, whilst there are nerve-ganglia between the coats.

I am indebted to Dr. H. M. Turnbull, Director of the Pathological Institute at the London Hospital, for the description of the sections.

I thought that the presence of a piece of intestine, well formed, both macroscopically and microscopically, in a small tumour, was sufficiently interesting to warrant my bringing it before the Section.

(The specimen and microscopic sections were shown.)

The PRESIDENT noted that in the specimen not only was intestinal muscle and submucous tissue present, but also well-defined mucous membrane and epithelium lining the intestine, and this fact made him surprised that Dr. Andrews had not called his specimen a teratoma, rather than a dermoid, as hypoblastic structures were present. He asked if Dr. Andrews had any views as to the development of these structures in the ovary, and as to the kind of stimulus which the germ cells needed to start such processes.

Urgent Cæsarean Section for Prolapse of the Cord in a Case of Contracted Pelvis.

By C. Hubert Roberts, M.D.

I thought an account of this case might be of some interest to members of the Section, owing to the somewhat unusual and urgent nature of the conditions requiring Cæsarean section. The patient was a primigravida, aged 31, who was admitted to Queen Charlotte's Hospital at 12.55 p.m. on September 28, 1912, having been sent up by her doctor undelivered and with the cord hanging out of the vagina. Labour had commenced the same day at 3 a.m., and the membranes had been ruptured artificially at 7 a.m. This was followed immediately by prolapse of the cord, but no advance had taken place in the descent of the child, though accompanied by strong pains. I also gathered from the nurse who came up with the patient that there had been a good deal of interference and frequent vaginal examination, but that forceps had not been attempted.

On admission the patient was having good pains every ten to fifteen minutes, the vertex presented in the first position, but was very freely movable above the brim of the pelvis, and it had not engaged in at all nor could it be pushed into the brim. Measurements of the pelvis were as follows: Interspinous, 10 in.; conjugate external, 7¼ in.; intercristal, 10 in.; conjugate diagonal, 3¾ in.; conjugate vera estimated at 3¼ in. The cervix was only about half dilated and several coils of cord were found lying in the vagina, pulsating strongly at about 120 to the minute. The cord was carefully cleansed with lysol solution, and the vagina swabbed out. An attempt was then made to replace the cord with the patient in the knee-chest position, but this was not successful. As the cord pulsations were now getting slower, after consultation on the telephone, I instructed my resident medical officers, Dr. Sherwin and Dr. Gilliatt, to prepare the patient for an immediate Cæsarean section, as I could see no other means of saving the child's life.

I did not wash out the uterus with weak lysol, as suggested by Dr. Maxwell in a former paper which he read before this Section—in fact, so hurried was the case that we had little time to do any elaborate preparation of the patient. I performed an ordinary conservative Cæsarean section, through median subumbilical incision, and a living male child, weighing 7 lb. 4 oz., was delivered. The placenta was situated on the anterior uterine wall and the hæmorrhage for a few minutes was considerable. I may say that among my series of Cæsarean sections I have found the placenta situated anteriorly in more than half the cases. After delivery of the placenta and membranes the uterus was gently swabbed out with 1 in 4,000 perchloride of mercury solution. I closed the uterine wound with deep and superficial interrupted silkworm-gut sutures. The uterine contractions were good. The patient was not sterilized. I closed the abdominal wall in two layers, the peritoneum with fine silk, and the muscle and fascia with interrupted silkworm-gut through-and-through sutures. I prepared the skin before operation by the ordinary iodine method and simple gauze dressings were used.

The child, weighing 7 lb. 4 oz., was born in a state of white asphyxia, which, as I have pointed out elsewhere, is usually the case in Cæsarean section babies. It was very difficult to revive, but eventually, after a hot bath and artificial respiration, its condition was satisfactory.

The patient's condition at the end of the operation was quite good, but the pulse rather more rapid than I liked (132). Owing to the uterus being more or less "suspect," 25 c.c. of antistreptococcic serum were given at 4 p.m. the same day and again at 10 p.m. Rectal salines were also given four-hourly.

Next day (September 29) the patient's condition was fair, but the pulse 130. September 30: Pulse had fallen a little to 128, and the temperature was 99° F. There was some abdominal distension and vomiting; this was relieved by a turpentine enema; antistreptococcic serum was given at 10 a.m. and 8 p.m. The child's condition was quite good. October 1: Temperature 99·6° F., pulse 124; still rather distended and inclined to vomit, but is more comfortable. October 3: Temperature 101° F., pulse 120; lochia slightly offensive and uterus rather larger than I liked, but not tender. October 6: Temperature and pulse normal; lochia still rather offensive and pale, the wound is satisfactory and some of the sutures were removed. October 10: Is doing well, but the pulse-rate is again 120 and temperature 100° F.; lochia pale, but rather excessive. October 11: Pulse and temperature now normal; lochia pale and considerable. My colleague, Dr. Stabb, kindly examined the case, but found nothing abnormal: the involution of the uterus seemed now to be progressing more satisfactorily. All the sutures were removed on October 10, thirteen days after the operation, and the wound was firmly healed. After this, the patient's convalescence was quite uninterrupted. She was allowed up on October 20 and left the hospital quite well with her baby on October 23 (three weeks after her operation).

The child did well and was fed after the first few days on breast and bottle (1—2), the milk being prepared after the Queen Charlotte's ordinary formula (milk-water, sugar of milk, cream and citrate of soda). The baby gained 1 lb. 6 oz. while in the hospital, the cord came off on the seventh day, and it was vaccinated on the eleventh day.

I apologize for taking up the time of the Section in reporting this case, but a few points seem, perhaps, worthy of discussion and criticism.

(1) The urgency of the case, in order to save the child's life: I confess I do not like urgent or hurried Cæsarean sections, but no other method of delivery seemed to me possible with a conjugate of 3¼ in. (estimated).

(2) *Should I have removed the uterus?* as it was certainly "suspect," and I think the subsequent subpyrexial condition of the chart and rapid pulse rather went to prove this. I regret that no time was available beforehand for the taking of a uterine culture, though I might have done so when the uterus was opened.

(3) *The questionable value of giving antistreptococcic serum* in such cases, as autogenous vaccines must be far more efficacious.

(4) *The slow involution of the uterus noted.* This may have been due to a slight sapræmic condition, but I am sure I have seen cases of slow involution after ordinary Cæsarean section where there was no suspicion or possibility of infection.

I am indebted to Dr. Sherwin for kindly preparing the notes and chart of the case shown.

The PRESIDENT congratulated Dr. Roberts on the result of his timely operation. No other treatment could have saved the child. The only point of doubt seemed to be whether the case was sufficiently "suspect" to make a conservative Cæsarean section dangerous. The tardy and septic convalescence would probably have been averted if the Cæsarean section had been followed by subtotal hysterectomy. It was a question whether, even apart from pelvic contraction, it would not sometimes be justifiable to perform Cæsarean section in a "clean" case, if the cord was prolapsed, the child alive, and the genital passages undilated.

A Short Paper on Le Fort's Operation (with an account of Eight Cases).

By J. M. Wyatt, F.R.C.S.

In the *Bulletin de Thérapie* of April, 1877, Le Fort[1] first described a new method for the cure of prolapse. He had observed that descent of the uterus was almost always preceded by that of the vagina, the walls of which became, so to speak, unfolded and then protruded, and he considered that if these walls could be kept in constant contact with one another any prolapse would become impossible. This suggested the idea of uniting them by suturing after having removed from each a vertical slice of the mucous membrane.

Le Fort first recommended that the width of the mucous membrane removed from each wall should be about 1 to 1½ cm., but later increased that to 2 cm., and he also stated that the depth to which one should reach in freshening up the parts should be as slight as possible; otherwise in dealing with the posterior wall high up one would run the risk of opening the pouch of Douglas, as was once done by a French surgeon, Tillaux, the patient in this case dying from peritonitis. Le Fort used silver wire for suturing, as two cases in which silk was used failed, owing to the sutures failing to hold. The wire was pushed to the centre of the raw surface, as if the edges only were taken he found that the centre part filled with blood-clot and did not unite; he removed the sutures at the end of fifteen days.

In 1889, André, in a thesis, collected forty cases, thirty-five of which were successful, and he also remarked that this operation does not prevent coitus, fecundation, or parturition, the latter having occurred in one of Le Fort's cases, which had been operated upon a long time previously, and all that was required to allow the fœtus to pass was to cut through the septum. This method of making a vaginal septum was also practised by Spiegelberg, who, in the *Klinische Wochenschrift* of 1872,[2] describes an operation of suturing the lowest points of the anterior vaginal wall to the upper part of the posterior wall, although Neugebauer claimed the priority for this method, calling his operation elytrorrhaphia mediana. And previous to Le Fort's paper in 1877, Jobert de Lamballe, a French surgeon, practised an operation of removing two strips of

[1] *Bull. gén. de Thérap.*, Par., 1877, xcii, pp. 337-44.

[2] *Berl. klin. Wochenschr.*, 1872, ix, pp. 249, 262.

mucous membrane from the anterior vaginal wall, leaving a certain interval of intact mucous membrane between them, and by suturing the two raw surfaces together, making a permanent fold which narrowed the vagina, this narrowing being produced by a lateral fold rather than by an antero-posterior one, as in Le Fort's method. Even as long ago as 1823 Gérardin, of Metz, obliterated the vagina in cases of prolapse by dissecting up to a certain extent the mucous membrane of the lower part of the vaginal walls, and then suturing the two raw surfaces.

I bring this paper before you to-night as I cannot find any series of cases recorded in the English literature, and by Dr. Tate's kind permission I will shortly give you a record of eight cases he has done at St. Thomas's Hospital. Dr. Galabin, in his text-book on "Gynæcology," described the operation, and said it was the best operation he knew for the treatment of prolapse, and he had never known a case to fail, although he had performed it when ventral fixation had failed. Mr. Doran also, in his "Gynæcological Operations," gives a short description of the operation, but most of the other text-books do nothing more than mention the operation, with no description at all. The operation seems to me of great value in cases of procidentia in old people, where any form of pessary fails to keep the womb in position, and where, either on account of the age or from the condition of the abdominal wall, a laparotomy for fixation methods is contra-indicated. The method used by Dr. Tate prevents any question of active sexual life, as the canals left do not do more than admit the little finger, and if they were left wider than this or dilated up it is more than probable that the uterus would gradually find its way down again. So, although André mentioned that coitus, &c., was not prevented by Le Fort's method, it undoubtedly is in the method adopted in the cases I am about to describe, so that it has only been done in single women, widows, or women who no longer lead actively sexual lives.

The differences from Le Fort's original method are:—

(1) The width of the septum, this being nearer 4 cm. than 2 cm.

(2) The suturing material; here catgut is used. In two cases silkworm gut was used, but as this form of suture had to be removed, and gave rise to some pain in removal, catgut was found preferable.

There are in all eight cases, and of these I have been able to trace and get reports from six. My thanks are due to Dr. Tate for allowing me to publish his cases, as at present I have only had the opportunity of doing two myself, and these so recently that reports of them are of little value, although up to the present time the results are very good.

Case I.—Widow, aged 61, with complete procidentia. She had had two children and no miscarriages. Her first child was born when she was aged 34; there was some laceration of the perineum, and on getting up she had a bearing-down pain, and was told by her doctor that the womb came down. Her second child was born when she was aged 38, and she had, according to her notes, a normal labour, but was in bed for two months; on getting up she found that the uterus appeared at the vulva. She wore a belt and various forms of pessaries for eight years, but as she obtained no relief from these she left them off and for the next eight years went about without any form of support. Then, at the age of 54, she had an operation at Grantham, which was not successful, and was followed four years later by another, which improved matters for a short time, but the condition of prolapse soon recurred, and she was in bed practically constantly for three years till her admission to St. Thomas's, when it was found that the uterus was completely prolapsed. Le Fort's operation, combined with a perineorrhaphy, was performed, and the wound healed by first intention; this was in the winter of 1901. In March, 1912, her reply to my inquiry was that the operation was quite successful, and she had been able to walk about ever since and there had been no signs of recurrence.

Case II.—Married woman, aged 67. She had had no children, but two miscarriages, one at six weeks and one at four and a half months. Prolapse followed second miscarriage at the age of 42. Pessaries were worn with comfort for twenty years; then one large enough to be retained caused discomfort, so patient did her best with bandages, &c. On admission to St. Thomas's Hospital the uterus was completely prolapsed, and owing to its being very tender the patient was unable to sit down. Le Fort's operation was performed in August, 1905, and the wound healed by first intention. In reply to my inquiry her husband wrote that she died in November, 1909, but that up to that time the operation had been quite successful and a means of great help and blessing to her.

Case III.—A single woman, aged 50, who had had prolapse for twenty years, gradually becoming worse and causing frequency of micturition. On admission it was found she had a complete procidentia, and in June, 1906, Le Fort's operation was performed, followed one year later by a perineorrhaphy. The reply from the patient received in March of this year states that the operation was very successful, and she does not feel anything of the prolapse now.

Case IV.—A married woman, aged 52, who, in April 1891, came to the Hospital complaining of prolapse. She was found to have a hypertrophic elongation of the cervix; so a part was amputated. But this did not relieve the condition, so in October of the same year a supravaginal hysterectomy, with ventral fixation of the stump, was done. Until February, 1906, she remained well, but from then the prolapse gradually returned, and on admission she was found to have complete prolapse of the vaginal walls and cervix, with two large ulcerated areas on the mucous membrane; this latter condition was treated, and in August, 1907, a Le Fort's operation was performed. In reply to my letter, she states she is much better and has no pain, but there is still a slight prolapse.

Case V.—A widow, aged 70. Prolapse of uterus commenced at the age of 50, and for the last nine years she had worn pessaries. During the last three months these had failed to keep the uterus in position, and she had had frequency of micturition (having to empty the bladder every ten minutes) and severe constipation. On examination the cervix was found to protrude beyond the vulva and to be slightly ulcerated; this latter condition having been cured, in January, 1908, a Le Fort's operation was done. Her reply to my inquiry stated that she was in splendid health, and since the operation had had no prolapse.

Case VI.—A married woman, aged 51, who had had prolapse of the uterus for eighteen years. She wore a ring for some years and when this became inadequate a cradle pessary. Five years before admission operative treatment was advised, but she would not submit. At the time of admission pessaries were of no use. She had severe backache and could only micturate when the prolapse was replaced. On examination she was found to have complete procidentia, so a Le Fort's operation was done in February, 1910. In answer to my inquiry, she replied she had been very well since operation, and had had no further trouble.

Case VII.—A single woman, aged 53, who had had partial prolapse of the uterus for eighteen months, which had become complete within the last few weeks. Le Fort's operation and a perineorrhaphy were performed in April, 1906, and on her discharge one month later she had a good vaginal septum with no tendency to prolapse.

Case VIII.—A widow, aged 62, who had had prolapse of the uterus for twenty years, which she had supported with binders till three months ago, when the prolapse became complete and could not be kept up. There was difficulty with micturition, which could only be completed by reducing the prolapse. A Le Fort's operation was done in May, 1908, and on her discharge she was quite well.

These two latter cases I have not been able to trace.

DISCUSSION.

Dr. GRIFFITH stated that he had performed this operation a few times only, and the results appeared to be most satisfactory. His first was in a case of great prolapse following supravaginal hysterectomy. He had not so far satisfied himself how near to the vaginal orifice it was best to unite the vaginal walls. He had good results from the patient's point of view, leaving the lower inch of the vagina ununited.

Dr. Cuthbert Lockyer hoped that Mr. Wyatt's paper would have the result of making Le Fort's operation more widely known. He had employed Le Fort's technique for a case of complete prolapse (procidentia) in an old lady, aged 87, who was bedridden, mainly owing to the prolapse. Before operation the trouble with micturition and defæcation was extreme, and a nurse was in constant attendance. Catgut was used for the buried vaginal sutures, and these were passed beneath the raw surfaces made in the anterior and posterior vaginal walls. The little finger could be passed up the vagina on each side of the new median raphé ; the latter was carried down to the edge of the perineum behind, and close to the urethral orifice in front. A crescentic incision was made in the perineum, and this was sewn up longitudinally by interrupted fish-gut sutures, thus narrowing the introitus. Union was good, and recovery complete, and the patient was afterwards able to walk about, and lost all her tiresome symptoms.

Dr. Tate was strongly of opinion that in certain cases of complete prolapse in elderly patients, Le Fort's operation gave more satisfactory results than the plastic operations on the perineum and vaginal walls, even combined with ventral fixation, and he did not usually advise the operation of ventral fixation in elderly patients; in making the raw surface, he was always careful to carry the dissection right down to within ½ in. of the urethra anteriorly, and to the anterior right of perineum posteriorly. He thought this ensured the most successful and permanent results. Dr. Tate would not be disposed to perform the operation on any patient in whom subsequent pregnancy was possible, as had been supported by some operators, as he considered division of the septum under these circumstances a very unsatisfactory procedure.

Dr. Eden said that he had performed this operation in a few cases, and he considered it a very good operation for procidentia in elderly women. As regards technique, he had not thought it necessary to carry the denudation so low as Dr. Tate described, and he had always left the lower 1 in. of the vaginal canal intact. He thought it important, in suturing the raw surfaces together, to pass each stitch beneath the denuded area of one vaginal wall and bring it back beneath the denuded area of the other vaginal wall ; the stitch was then practically buried, and the whole width of the raw surfaces was held together. He had always used catgut.

Definition of Stillbirth.

The President announced that Dr. Dudfield, Chairman of the Committee of the Royal Statistical Society, had written to the Council of this Section informing them that it was proposed to hold a discussion on "Stillbirth," especially as regards its registration, and asking if the Council could supply them with a well-considered definition of "stillbirth." The Council therefore appointed a sub-committee consisting of Dr. Walter Griffith and the Executive.

The Council, in considering the report of this sub-committee, fully realized the difficulty of making a definition which was sufficiently broad and yet scientifically correct, and which would apply to tests made both by experts and by less well informed persons. The following definition was adopted by the Council and will form the basis of a discussion at the Statistical Society, at Adelphi Terrace, on November 19, at 5 p.m.:—

"A stillborn child means a child which measures more than 13 in. in length from the top of head to the heel, and which, when completely extended from the body of the mother (head, body and limbs, but not necessarily the afterbirth), exhibits no sign of life by crying or breathing, or by pulsation in the cord at its attachment to the body of the child, or by beating of the heart."[1]

---

[1] *Note.*—The final test of life is the pulsation of the heart, but this can only be ascertained by an expert.

65

Obstetrical and Gynæcological Section.

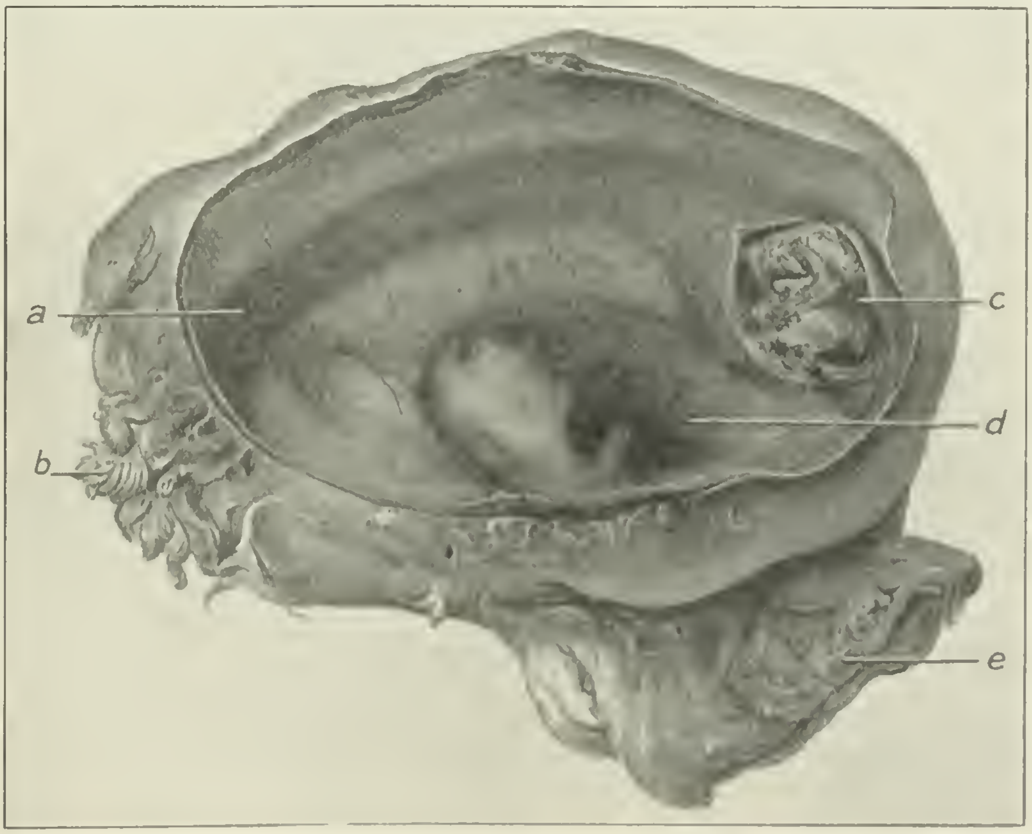
December 5, 1912.

Dr. Amand Routh, President of the Section, in the Chair.

Tubal Gestation: Rupture of a Gravid Tube into a Broad Ligament Cyst.

By Herbert Williamson, M.D.

The specimen I show this evening is of interest not merely as a pathological curiosity but as offering an explanation of some cases of



Gestation in a Fallopian tube stretched over the surface of a broad ligament cyst. *a*, Fallopian tube; *b*, tubal ostium; *c*, blood-clot containing chorionic villi; *d*, broad ligament cyst; *e*, pedicle.

hæmorrhage into broad ligament cysts where there is no torsion of the pedicle or obvious rupture of vessels in the wall.

Clinical history: Removed by operation from a woman, aged 41, who had borne four children, the last three years previously. Her menstrual periods were regular until March, 1907; from that time until May there was irregular vaginal hæmorrhage, and on two occasions attacks of severe abdominal pain. When examined on May 18 the uterus was displaced forwards and to the left by a tender elastic body the size of a hen's egg, which occupied the right posterior quarter of the pelvis. During the course of the next week there were daily attacks of abdominal pain, and the swelling increased to the size of a large orange.

Description: A cyst of the right broad ligament over which is stretched a gravid Fallopian tube. The cyst is the size of a goose's egg, and contained clear fluid. A window has been made in its wall to display a swelling of the Fallopian tube the size of a filbert, which projects into the cyst cavity. A cut made in the long axis of the swelling has allowed a mass of blood-clot to protrude. The fimbriæ of the tube adhere to one another and to the cyst wall. At the lower part of the specimen is seen the pedicle consisting of the broad ligament.

Microscopical examination: The contents of the swelling consist of blood-clot in which are embedded chorionic villi.

Rupture of a Hæmorrhagic Corpus Luteum into a Broad Ligament Cyst.

By S. G. Luker, M.D.

The patient was a married woman, aged 27, who had had one child, eight years previously. She first felt pains in the lower abdomen on August 5, 1912; her last normal menstrual period took place July 13-18. On August 16 she had an acute attack of pain which made her vomit. Five days later she had another acute attack of pain and started losing blood *per vaginam*. She had thus gone five days longer than her ordinary intermenstrual period. She was admitted to the London Hospital on August 21. Pulse, 88; temperature, 100·5 F. Tenderness and resistance in the lower abdomen, right side. *Per vaginam*, a very tender swelling to the right of and behind the uterus. The pulse-rate rose hourly till, at 8 p.m., it was 118. Ectopic pregnancy was suspected, and laparotomy was performed.

On opening the abdomen a bilocular cystic tumour was found occupying the right broad ligament, together with hydrosalpinx of the right tube. The tumour was removed. One of the cysts contained clear fluid; the other several ounces of dark red hæmorrhagic fluid. Macroscopically, the right ovary was found spread out over the lower part of the tumour. It contained a large hæmorrhagic corpus luteum which had ruptured into the cyst. This was confirmed by microscopical diagnosis. One section cut through the site of the ruptured corpus luteum showed a break in the wall of the corpus luteum filled by a plug of red thrombus. The thrombus projected into the cyst. Another section through the wall of the cyst showed that the latter was mainly formed by the fibromuscular tissue of the mesosalpinx. At one spot the lining of the cyst was present and consisted of a single row of short columnar cells. Several small epoöphoric tubules were seen embedded in the muscular tissue.

The case was of interest for the following reasons:—

(1) The symptoms and signs resembled those of ectopic pregnancy.

(2) The source of the hæmorrhage into the cyst was uncommon.

Tubal Hæmatoma.

By H. Macnaughton-Jones, M.D.

The specimen which I show is interesting from the point of view that it is a second ectopic pregnancy occurring in the opposite tube; also from the fact that the usual histological proofs of gestation appear to have been absent. My intention in bringing it before the Section in the first instance was to elicit a definite opinion as to its ectopic character.

The patient from whom it was removed was a nullipara, aged 29. She had been married seven years, and there had been no miscarriage. Two years before I saw her the womb was dilated and curetted with a view to conception, and eighteen months subsequently the right Fallopian tube and the appendix were removed. It was then thought that there was a tubal pregnancy. The catamenia were regular after the operation, but for the last two months there had been persistent loss without cessation and continual pain in the left side. For the greater part of this time she had been confined to bed.

Bimanual examination revealed an adnexal swelling in the left fornix, partly occupying Douglas's pouch. It was soft, and rather boggy to the feel. At operation, the specimen shown was removed. There were considerable adhesions fixing it in the pelvis.

My view before operation was that the case in all probability was one of ectopic gestation, and the first report I received confirmed this opinion, inasmuch as some small chorionic villi were said to be present, and strips of syncytium, embedded in the wall of the tube. The appearances were "those of early placentation." For special reasons I was anxious to have this view confirmed, and Dr. Cuthbert Lockyer very kindly furnished me with the following report, which, as will be seen, was not confirmatory of the previous one, in regard to the presence of any direct histological evidences.

REPORT BY CUTHBERT LOCKYER, M.D.

"Macroscopical: The specimen consists of the right tube and ovary and intervening mesosalpinx. The tube is much distended in its outer half by blood-clot and there is an adherent clot overlying the upper part of its proximal half. This clot is the size of a small walnut and is intimately adherent to the tube wall. The outer distended portion presents to the naked eye as a blood-sac which has been adherent to adjacent structures and which shows a puckered projection on its posterior surface, as if it had been ruptured. This part of the tube is separated by a sulcus from the external clot which adheres to the non-sacculated inner half of the tube. The fimbriæ are lost, and the ostium has become sealed. The ovarian fimbria is engorged with blood and is the only part of the tube in actual contact with the ovary. The ovary itself is enlarged and much puckered on its anterior surface, whilst its posterior surface shows a small peripheral cyst. The length of the tube is 3 in. The sacculated portion is 1 in. in diameter. On section the ovary contains a cyst 1 in. in diameter, and in its walls are the remains of a corpus luteum. The ovary is very cystic throughout. It measures $1\frac{1}{2}$ in. by 1 in. The adherent blood-clot appears to the naked eye as a paratubal hæmatocele of small size.

"Histological: The sections cut for microscopical examination have been taken from the centre of the hæmatosalpinx. They show no chorionic villi, nor is there any other evidence of pregnancy. I believe, that this is a case of extra-uterine gestation, and should like permission to make further sections, but so doing will, of course, damage the naked-eye value of the specimen.

"Final report: Other sections have been cut from the centre of the paratubal hæmatocele, but here again there are no chorionic villi nor other evidence of pregnancy. I do not feel disposed to exclude pregnancy in the tube, as I know of no other cause which would produce this condition."

Dr. Lockyer's report was also confirmed by Dr. Turnbull, of the London Hospital Medical College, who kindly examined one of the sections which I sent him; he saw no evidences of gestation. The differentiation of a hæmatosalpinx which is not of the molar type from an early tubal ectopic gestation would appear to depend upon the presence of some distinct evidence of a conception.

Sir J. Bland-Sutton, in his work, says that the term "hæmatosalpinx" should be exclusively reserved for those cases in which the abdominal ostium of the Fallopian tube is closed and the dilated portion occupied by clot, in which there is no evidence of pregnancy, such as an embryo, apoplectic ovum, or chorionic villi. Further, he says that "nearly all specimens supposed to be examples of hæmatosalpinx are cases of tubal gestation."

Whatever view be taken of the prospect of a spontaneous cure in such a case, it is clear that no such favourable issue could have occurred in this instance.

Though it would appear that there had been a rupture of the tube, still, this was sealed by the adherent blood-clot, and, the ostium being closed, there was no internal hæmorrhage and the blood escaped by the uterus.

Report of Pathology Committee.—"The specimen shows no microscopic evidence of fœtal tissue; nevertheless there is an extensive hæmorrhage in the wall of the tube; the lumen, however, remains unaltered and the plicæ are normal."

The Contraction Ring as a Cause of Dystocia, with a Description of a Specimen removed by Hysterectomy during Labour.

By Clifford White, F.R.C.S.

In 1907 Andrews and Maxwell [1] showed a gravid uterus removed from a living patient. In the description of the specimen, a ring which was present was called a "contraction ring." In the discussion which followed Eden stated that the words "retraction ring" should have been used, but Maxwell gave reasons for the use of the other term, whereas Andrews subsequently referred to the case as one with a "retraction ring." Willett [47] and Williamson [48] report two cases, using the word "contraction," but Jardine [30] uses the other term when reporting cases similar to those of the former writers. These references are given to show how loosely the terms are used; in fact with some the terms "contraction ring," "retraction ring," and "ring of Bandl" are synonymous, and yet, strictly speaking, the conditions are not similar. The retraction ring is usually associated with the name of Bandl and obstructed labour, whereas Schroeder drew attention to the production of a ring in normal unobstructed labour, and applied to it the term "contraction ring."

The condition not being discussed in the majority of text-books, and having recently had the opportunity of examining a specimen with a contraction ring obtained by excising the gravid uterus, I have attempted to define and give the symptoms of the two conditions. The differential diagnosis is advanced in the hope that the contradiction or agreement of the Fellows of this Society with the points mentioned will put the matter on a firmer footing then it is at present. This differentiation of the two conditions is only tentative, for as further knowledge of the conditions is gained so the question of classification will have to be reconsidered. Probably under the term "contraction ring cases" several clinical entities are included which differ from each other in important points, for instance, in the amount of relaxation of the body of the uterus, with its consequent effect on the presenting part.

DIFFERENTIAL DIAGNOSIS.

CONTRACTION RING.	RETRACTION RING.
(1) A localized thickening of the wall of the uterus due to the contraction of the circular fibres over a point of slight resistance, most frequently over a depression in the child's outline or below the presenting part.	(1) The junction of the thinned lower uterine segment with the thick retracted upper uterine segment.
(2) The uterine wall at the site of the contraction ring will therefore be thicker than it is either above or below.	(2) The uterine wall above the retraction ring is much thicker than it is below it.
(3) The wall below is neither thinned nor over-distended.	(3) The wall below a retraction ring is both thinned and over-distended.
(4) The presenting part is not forcibly driven into the pelvis.	(4) The presenting part is or has been jammed into the pelvis.
(5) The child may be wholly or mainly above the contraction ring.	(5) Part of the child must be below the retraction ring.
(6) The body of the uterus above a contraction ring is usually relaxed and not tender.	(6) The body above a retraction ring is tonically contracted and hard.
(7) Round ligaments are not tense.	(7) Round ligaments stand out.
(8) A contraction ring may occur in the first, second, or third stage of labour.	(8) A retraction ring practically always occurs late in the second stage of labour.
(9) A contraction ring does not vary in position as labour goes on.	(9) A retraction ring gradually rises as retraction of the upper uterine segment proceeds.
(10) A contraction ring is rarely felt on abdominal examination.	(10) A retraction ring may frequently be felt *per abdomen.* (?)
(11) The patient's general condition is good.	(11) The patient's general condition is bad.
(12) Causation :— Premature rupture of the membranes. Intra-uterine manipulations.	(12) Causation :— Obstructed labour.

THE EXISTENCE OF A LOCAL CONTRACTION OF THE UTERUS.

Herman [26] and Veit [45] seem to doubt the existence of a localized contraction of the uterus apart from obstructed labour, and yet there is nothing inherently improbable in its existence, as Bar [3] noted that the two tubes of the double uterus of a rabbit need not contract simultaneously, and Treub [43] showed the same thing in a double human uterus. The actual existence of such a contraction ring is proved by measuring the thickness of the wall of a uterus and noting that in the ring it is thicker than above or below. This was done in one of Phillips's cases recorded by Holland [28], in Andrews and Maxwell's [1], Schroeder's [38], Lusk's [32], and the specimen shown to-night. Berry Hart [25] pointed out that during labour the anterior wall of the uterus was about 6 mm. thicker than the posterior, so that it is essential that all measurements should be taken on the same side.

THE RING FORMS OVER AN AREA OF SLIGHT RESISTANCE AND TENDS TO FIT INTO DEPRESSIONS ON THE CHILD.

In Andrews and Maxwell's case the ring corresponded with the groove of the child's thigh, in one of Budin's [10] to the hollow of the knee. Forming below the feet in incomplete breech presentation, its importance is insisted on by Lewis [31], Jardine, and de Bovis [7]. It has also formed round the thorax (Chavane [12], Boquel [6]), shoulder and neck (Demelin [15] and others), and round the arm (Bué [11], Hicks [27] and others), but in the great majority of cases it forms round the neck. In two cases (Budin's and Fabre and Dangat's [20]) the fœtus was anencephalic. Finally, it may form below the presenting part (Smith [40], Sinnetamby [39], Jardine, Formichella [21], and others).

The position of the contraction ring in the cases I have collected is: Round neck, about 45 per cent.; below the whole of the child, 21 per cent.; round the arm, 15 per cent.; round thorax, 9 per cent.; round the neck of the after-coming head, 9 per cent.

In showing the part played by the fœtal outline in the formation of the ring an observation of de Bovis is of importance. The ring fitted tightly in the popliteal space of a child presenting as an incomplete breech. He dilated it with difficulty and finally reached a foot, but the prominence of the ring prevented the foot being brought down. On following the ring backwards to the level region of the child's back, he states that he was agreeably surprised to find that the ring became less and less marked till it was practically non-existent. He took advantage of this in finally delivering the child.

THE WALL BELOW THE CONTRACTION RING IS NOT THINNED OR OVER-DISTENDED AND THE PRESENTING PART NOT FORCED DOWN INTO THE PELVIS.

In a retraction ring case the thickening of the upper uterine segment is compensated for by a thinning of the lower segment and at the junction of the two the ring forms. The presenting part must have been fixed in the pelvis in order to give the uterus a *point d'appui* to contract and retract against; for instance, it is inconceivable that thinning of the lower uterine segment could occur with a hydatidiform mole. The presenting part is jammed and fixed in the pelvis except in the theoretical case where secondary uterine inertia has supervened on the top of tonic contraction.

On the other hand, with a contraction ring the wall below is not thinned, neither is it over-distended. Clinically, thinning is difficult to determine, and so more importance should be paid to the absence of distension than to apparent thinning. Demelin [17] describes the wall below as "flasqué et lâche," Dickinson [18] as relaxed and not thinned, and Sinnetamby as hanging loosely in the pelvis below the ring.

The presenting part is, moreover, as a rule not fixed or forced down in the pelvis. In some cases it is below the presenting part: this alone should exclude a retraction ring at once. When round the neck the head is not fixed, and this (as shown experimentally by Demelin) is one of the reasons why forceps fail, as they slip off unless applied over the occiput and face. Spiegelberg [42] gives the clinical picture when describing what he calls "close application of the uterine wall to the fœtus." He says the condition is generally called "tetanic constriction," but he continues, "Such is not the true condition, for the presenting part is not firmly impacted in the pelvic brim, the uterus is not sensitive to pressure, nor does the hand, on being introduced, meet with any great resistance."

CONDITION OF THE BODY OF THE UTERUS.

In a contraction ring case the fundus, as a rule, is soft and still undergoing contractions and relaxations. In a case of Brindeau's [9] the body was so soft that the presentation of the child changed after rupture of the membranes, and in several cases (Sinnetamby, Radcliffe [35]) *post-partum* hæmorrhage occurred, which is very rare in tonic contraction. The ring, when sufficiently marked to cause distocia, does not relax with the rest of the uterus. Budin even states that it seemed to get tighter. In exceptional cases the body of the uterus is hard and does not relax. In the same way the fundus, as a rule, is not tender.

TIME OF OCCURRENCE.

Except in rare cases of organic obstruction to dilatation of the cervix (e.g., by carcinoma) a retraction ring is always seen late in the second stage.

Contraction rings are also most frequently found in the second stage, probably because it is at this time that the hand is introduced to find the cause of the delay, but they are met with in the first stage with the membranes still intact (Budin, Smith, Jardine and Demelin [17]). The occurrence of a contraction ring during labour is followed by retention of the placenta in some 7 per cent. of cases. In Chavane's case the placenta was retained for twenty-four hours: he then called in Maygrier, who had the greatest difficulty in getting through the ring. During the puerperium intra-uterine douches were necessary, and he records that even the intra-uterine tube was gripped, thus showing the extreme irritability of the uterus. Hahl [24] noted gripping of the sound 6 cm. from the external os two months after delivery, when involution was so far complete that the total length of the uterine cavity was 9 cm. In a case recorded by Perrett [34] the ring again contracted tightly round his wrist while removing the placenta manually, and yet the fundus was sufficiently soft for him to proceed with the separation of the placenta, although the wrist was being tightly held. Dystocia by a ring has also occurred in three successive labours in the same patient (Smith) and has been noted with the second of twins (Smith, Williamson) and the last of triplets (Smith).

ABDOMINAL PALPATION AS A MEANS OF DIFFERENTIAL DIAGNOSIS.

Several writers state that the retraction ring is more easily palpable *per abdomen* than a contraction ring, but in a large number of cases of obstructed labour, owing to obesity, rigidity and other causes, the ring is difficult to feel, so that obstetricians of large experience may never have felt a retraction ring by abdominal palpation; on the other hand, the contraction ring has been felt on abdominal examination (Dickinson's third case, Hicks' first case); thus it appears very doubtful if this will be of any practical help in making a differential diagnosis.

GENERAL CONDITION OF THE PATIENT.

When seen early, before being exhausted by fruitless obstetric operations, the patient with a contraction ring is in good condition compared with the exhausted state of a patient with obstructed labour. For example, one of my patients after four days in labour had a pulse of 84 and was comfortable. Hicks describes a case where the patient was free from pain although the ring was so tight that cephalotripsy failed.

CAUSATION.

(*a*) *Premature Rupture of the Membranes.*—This is the most constant factor in records of cases.

(*b*) *Intra-uterine Manipulations.*—These are also very frequent, but it must be noted that unless some intra-uterine manipulation had been done the diagnosis could not have been made. The use of hydrostatic bags has been alleged [14] to cause the condition, but is unimportant. When used in cases of placenta prævia the abnormal condition of the lower segment produced by the low insertion of the placenta is probably of more importance than the bag.

(*c*) *Increased Irritability of the Uterus.*—It is obviously necessary to presuppose the existence of increased uterine irritability in addition to the two factors mentioned to explain the infrequent occurrence of contraction rings.

(*d*) *Mal-presentations.*—All forms are common. Chéron's [13] statistics are: Vertex, 62 per cent.; shoulder, 21·4 per cent.; face, 7 per cent.; breech, 8·9 per cent. De Bovis and Jardine lay stress on the frequency of incomplete breech presentations.

(*e*) *Maceration of the Fœtus and Infection of the Uterine Contents.*—Zweifel [49] drew attention to this in reporting a case. About 10 per cent. of recorded cases have been delivered of macerated children. Regarding the question of intra-uterine sepsis, the death-rate from peritonitis in cases treated by conservative Cæsarean section is high enough to show that it must be common.

(*f*) *Uterine Inertia.*—A long first stage with weak pains is usual in these cases. Blacker [5] lays stress on the association of uterine inertia with trismus of the cervix. Gilles [23], in recording a typical case, draws attention to the extreme inertia which was present for four days and persisted till the ring was divided during Cæsarean section.

(*g*) *Parity.*—Dickinson states that primiparæ and multiparæ are equally affected in his series of ninety cases. The cases which I have found in the literature described under various names amount to about the same number and overlap Dickinson's series very little; in my cases it is twice as common in multiparæ as in primiparæ.

PROGNOSIS.

This is bad for the mother and worse for the child. In Smith's series, which included several obvious retraction ring cases, the maternal and fœtal mortality was 27 per cent. and 83 per cent. Dickinson concludes that in well-marked cases one-third of the mothers and one-half of the children die. The present series (excluding laparotomy cases) shows a mortality of 58 per cent. and 63 per cent. In nineteen cases treated by laparotomy (excluding one death from eclampsia) the mortality is 31·5 per cent. and 42 per cent.

Three cases of labour with this complication have come under my observation:—

The first patient was aged 38 and had had two previous children (one normal delivery and one forceps). Labour started about mid-day on May 18, 1907; the membranes ruptured at 10 p.m. and high forceps were applied by her doctor, but failed; at 1 a.m. version was attempted, but only one leg could be brought down as far as the brim. At 3.30 a.m. she was admitted to Queen Charlotte's Hospital under the care of Dr. Arthur Stabb. Pulse, 128; temperature, 97·4° F. General condition good. The uterus was relaxed and like a case of secondary uterine inertia; the fœtal parts could be easily palpated. No ring felt on abdominal examination, but on vaginal examination a marked contraction ring could be felt. The child presented by the head and feet.

the body being arched over the fundus. The whole child, including the head, was above the ring. The ring ran round the uterus about 2 in. above the brim and prevented the head engaging. The fœtal parts were movable, but even pressure on the head applied through the abdominal wall could not bring it down into the brim. I repeatedly attempted to deliver by craniotomy, but failed to get the head past the ring, and finally ruptured the uterus through the posterior wall; the tear involved the ring. The child was now easily delivered by version, the placenta removed by hand, and the tear plugged with gauze. The patient died of shock shortly after delivery. No post-mortem obtained.

The second patient was aged 31, and had had five children. She was admitted to Queen Charlotte's Hospital, under my care, on account of a placenta prævia, on July 15, 1912. The child presented by the vertex. At 8 p.m. the membranes were ruptured and a de Ribes's bag inserted; at 9.30 Dr. Gilliatt, the Senior Resident Medical Officer, reported that the bag had been expelled, but on attempting version he had found a contraction ring 2½ in. in diameter, above the place where the bag had been, and 4 or 5 in. from the cervix. The placenta was partly below it, but the whole child was above it. The child being dead, I advised craniotomy and cautious traction; this, together with cleidotomy, effected delivery. The third stage was normal. The child (after perforation) weighed 5¼ lb. The mother did well.

The third patient is the one from whom the specimen shown to-night was removed. The history of the case is as follows: The patient was aged 34, and had five normal labours. Her fifth labour started on July 31, 1912, the membranes ruptured the next day, and feeble pains continued till August 4. Dr. James Wigg was then called, and found an arm prolapsed; he brought down a leg, but failed to get the child to move as a whole. The contraction ring could be felt, but it was possible to get the hand beyond it. The patient was then sent to University College Hospital. On admission at 2 p.m. her pulse was 84, temperature 99·2° F. The uterus was contracted, but relaxed at intervals and was not tender. Fœtal heart not heard. Chloroform was given, and version was attempted by Mr. Twining, the Resident Obstetric Assistant, but was not persisted with when the contraction ring was felt. Morphia ($\frac{1}{3}$ gr.) given. In the absence of the Obstetric Physician, I saw the patient at 5 o'clock. Her general condition was very good, uterus contracted, but not tender, the round

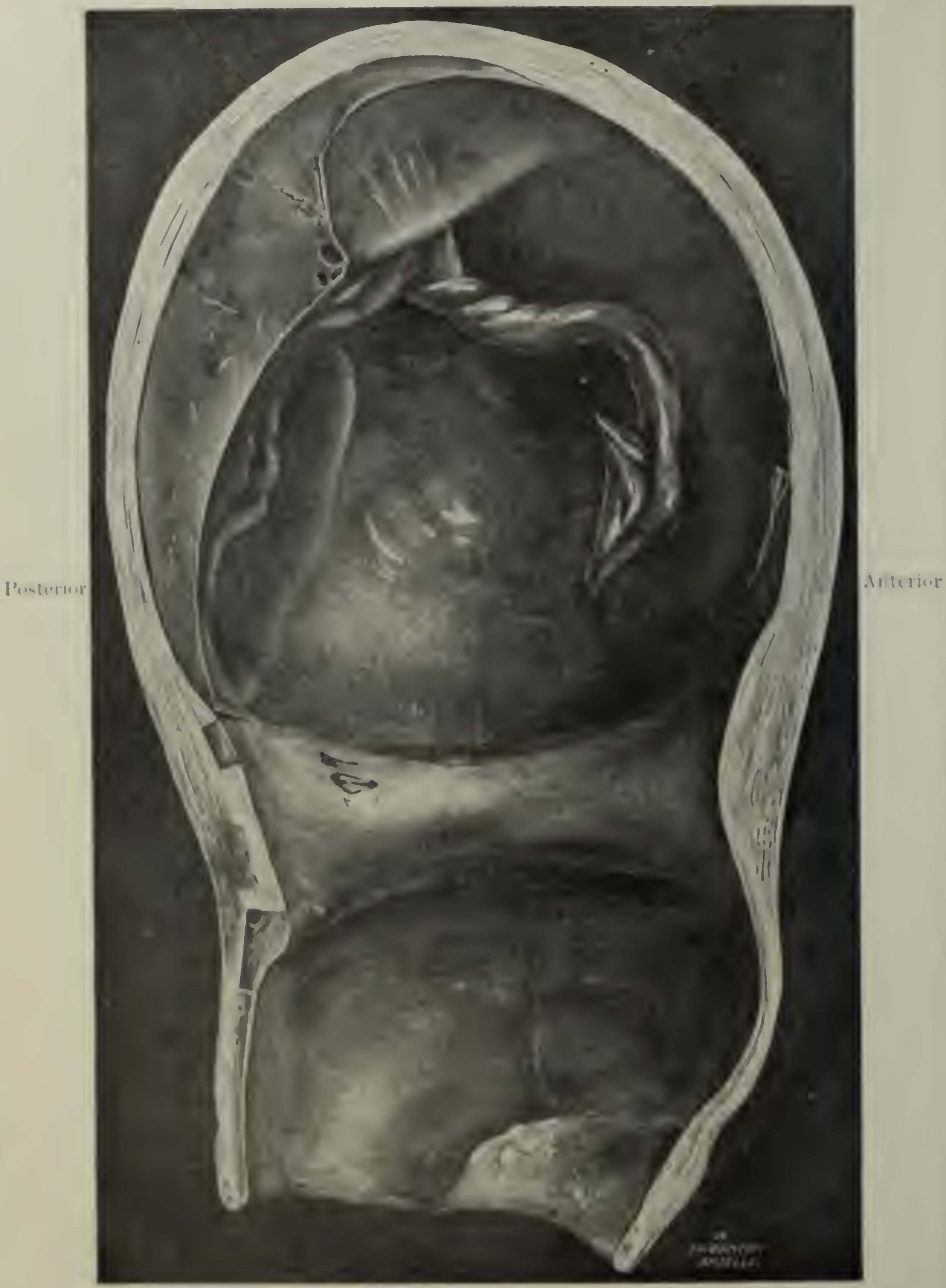


FIG. 1.

Mesial sagittal section of uterus removed during labour, showing contraction ring which caused dystocia. The child's head was immediately above the ring and the shoulder below it.

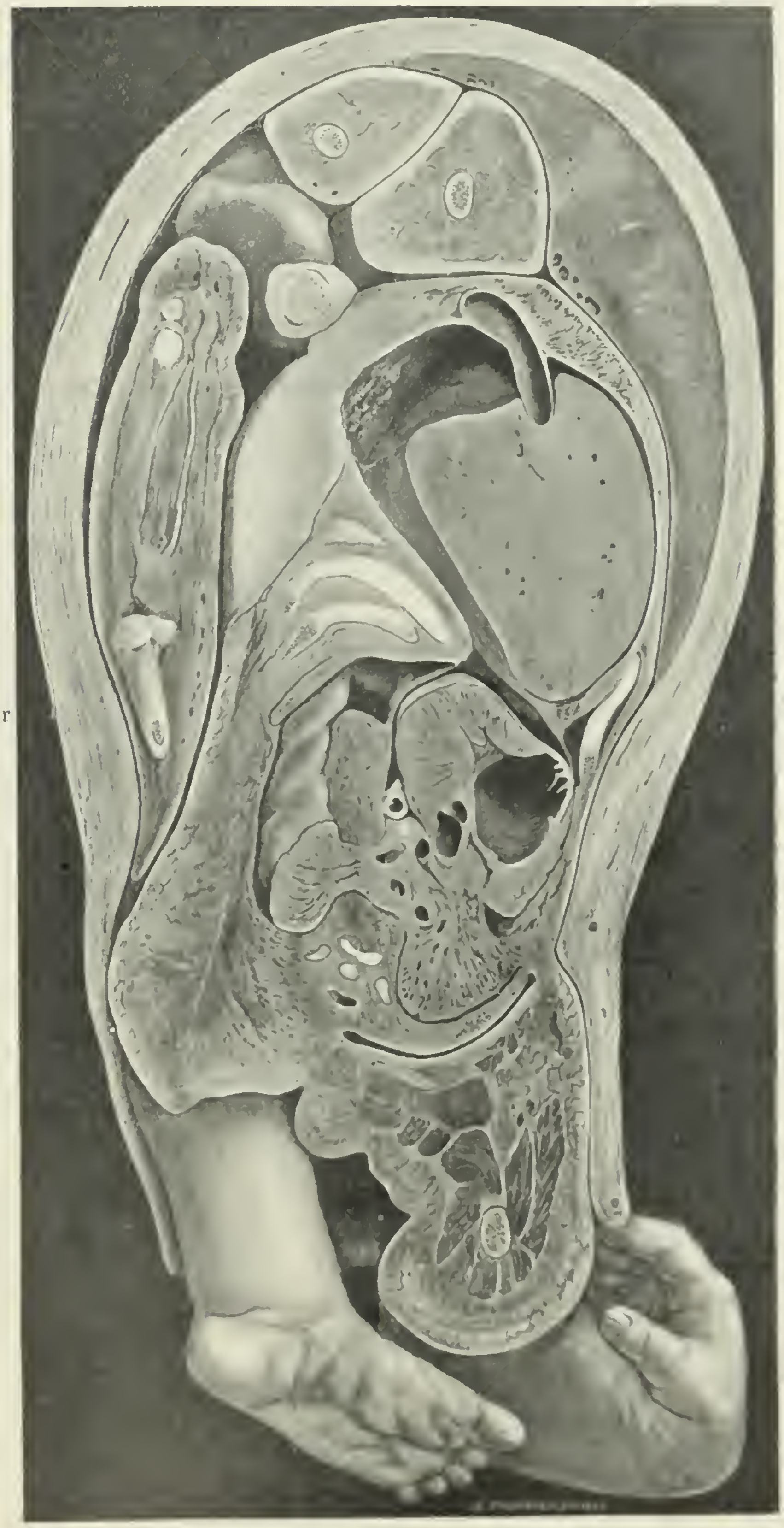


Fig. 2.

Mesial sagittal section of uterus with fœtus in situ. The child was presenting by the shoulder and a foot had been brought down in an unsuccessful attempt to perform version. The contraction ring can be seen running obliquely across the uterus. The upper uterine segment is not thickened and the presenting part was not fixed in the brim of the pelvis.

ligaments were not standing out. Bandl's ring was not felt *per abdomen*. *Per vaginam*, the lower uterine segment was not tense or thin, a foot and hand were presenting, but the presenting parts were not jammed down at all tightly into the brim. The cervix was fully dilated, so that the position of the external os could not be identified. A tight ring could be felt contracted round the arm; the lower level of the ring was so high that it could only be felt when the whole hand was introduced into the vagina. The ring was so tight that the finger could not be passed beyond it, and the use of any instrument for a destructive operation was out of the question. A culture was taken from the cervix and showed staphylococci. The patient had been torpid with morphia for two hours, and yet, even when chloroform was pushed to its full extent, no relaxation of the ring occurred. An attempt was made to give an intra-uterine douche as advised by Maxwell [33], but the ring was too tightly contracted on the arm to allow of the tube being passed to the fundus. The abdomen was then opened, and the uterus, with the fœtus inside, was removed entire. The ovaries were healthy, and were not removed. Before cutting through the vagina curved clamps were put on to the cervix as far as the prolapsed arm would permit, in order to prevent the contents of the uterus from soiling the peritoneum. The convalescence was without incident. The specimen was at once put into formalin to harden: the hardening process was completed by injecting strong formalin into the tissues of the fœtus.

Description of the Specimen.—The specimen shows the two halves of a full-term pregnant uterus divided in sagittal section. The vagina has been cut through at its junction with the cervix. The fœtus has been removed from the left half; in the right half the fœtus is still in situ. The specimen measures 25 cm. in length. Its antero-posterior measurement is 15 cm. at its widest part and 9·5 cm. at its narrowest below. Externally no ridge or furrow is to be seen, but a ring can be seen running round the interior of the uterus at the junction of the lower and middle thirds. It runs obliquely, so that in front it is 2 cm. higher than it is behind. The ring measures 3·5 cm. to 5 cm. from above down, and from 1·5 cm. to 1·7 cm. in thickness, this being an increase of 5 mm. to 8 mm. on the wall above and 8 mm. to 10 mm. on the wall below. The fundus is 9 mm. thick. The ring is most sharply defined on the left side where it constricted the child's neck. The child is almost wholly above the ring, and is lying in a very contorted position; the head is in the left half of the uterus, midway between the cervix and the fundus, and immediately above the ring. The ring thus constricts the neck and thorax. The right arm is prolapsed into the vagina, the left is above the head. The left leg is prolapsed beside the right arm, the right foot is at the highest point of the uterus, the leg lying along the anterior wall. The neck is deeply grooved where the ring had compressed it. The child is a male and weighed (after hardening) 5¼ lb. The placenta lies on the posterior wall near the fundus, and wholly above the ring. Microscopic sections were made of the wall of the uterus at various parts of the ring, but all histological detail had been destroyed by the strong hardening reagents that had been employed to harden the specimen.

TREATMENT OF DYSTOCIA CAUSED BY A CONTRACTION RING.

(1) *Expectant.*

This is useless, as in a severe case the condition persists. Budin waited thirty-six hours in one case, but the ring did not relax.

(2) *Drugs.*

(*a*) *Anæsthetics.*—Acting on the supposition (probably incorrect) that the condition is one of pure spasm, both chloroform and ether have been tried very fully, but have entirely failed to relax the ring in severe cases. Vallois [44], when delivering with craniotomy forceps, found that the ring did relax, but unfortunately it appeared that the moment of delivery coincided with the death of the patient from (it is alleged) an overdose of chloroform.

(*b*) *Sedatives.*—Morphia has failed even in large doses. Chloral hydrate has not been given any extensive trial, but from its action in cases of trismus of the cervix might be of use.

(*c*) Isolated cases are recorded where other drugs have apparently done good. Souter [41] claims to have obtained, in two cases, a temporary relaxation of a tonic uterus which enabled version to be successfully performed, by administrating 10 minims of amyl nitrite by inhalation. Williamson suggested atropine, but had not tried it. Hyoscine hypodermically failed in Watt's case [16]. Hot baths are said to have caused relaxation in one of Budin's cases.

(3) *Dilatation of the Ring.*

(*a*) *Manual.*—In the slighter cases this frequently succeeds. Budin suggested leaving the hand in situ to give the head an inclined plane to roll up. In severe cases the fingers cannot effect dilatation.

(*b*) *Instrumental.*—Bowen [8] and Hahl tried these and failed.

(*c*) *Dilatation by Traction.*—"Willett's Continuous Weight Traction." This ingenious method is limited to cephalic or breech presentations. An instrument (e.g., craniotomy forceps) is fixed to the fœtus and a weight traction of 6½ lb. suspended. It succeeded well in his case.

(4) *Forceps.*

These are limited to cephalic presentations with the head below the ring. In the more severe cases they fail entirely. The head is suspended by the ring round the neck, and in the majority of cases as soon as traction is made they fall off. Demelin, from experiments made, advises their application over the occiput and face so as to avoid the movements at the occipito-atlantal joint which causes them to slip off as soon as traction is made on the suspended head.

If a good grip is obtained the usual effect of traction is to drag the uterus as a whole down towards the vulva. Rupture of the uterus from the use of forceps has been known [16].

(5) *Embryotomy.*

Where forceps and version have failed, the destructive instruments have, as a rule, been tried next, but all writers agree that the embryotomies have been extraordinarily difficult, from the high position of the head and the difficulty of getting the instruments past the ring.

After perforation of the head the shoulders are held back if the ring is round the neck and traction by craniotomy forceps only moves the uterus as a whole. Cleidotomy is therefore indicated in every case where the ring is round the neck of a dead child.

Hicks cut off the head by curved scissors when cephalotripsy failed, and then delivered the remainder of the body by internal version above the ring. Andrews and Gauland [22] record cases where embryotomy has failed to deliver the patient.

(6) *Cæsarean Section.*

Cæsarean section is indicated where the ring is wholly below a living child. In other cases, *if simple traction or manual dilatation fails*, it is preferable to embryotomy if the child is alive. In considering Cæsarean section, it must be remembered that the embryotomy is always a very difficult one, and the death-rate from abdominal section has been due to sepsis, excepting Andrew's case, where the patient died of exhaustion, and Champneys's case of eclampsia (*vide* table).

In performing Cæsarean section it is often difficult to extract the child. Holland records that Phillips's two cases required transuterine embryotomy, and other operators have had to prolong the uterine incision so as to cut through the ring before the child could be delivered (Gilles, Holden, Watt (two cases), Duchamp [19]). Thus all extraperitoneal Cæsarean sections are contra-indicated, and *in septic cases*, if simple traction or manual dilatation fails the operations indicated are Cæsarean section followed by hysterectomy if the child is alive, or excision of the gravid uterus, unopened, if the child is dead.

CASES TREATED BY ABDOMINAL SECTION.

Operator		Parity	Presentation	Treatment	Result		Notes
					Child	Mother	
Cameron [30]		?	?	Cæsarean section	L.	L.	Recorded by Jardine
Champneys [36]	(*a*)	M.(2)	?	Cæsarean section	D.	D.	Death from eclampsia
	(*b*)	P.	Vertex	Cæsarean section	D.	D.	Death from peritonitis; both recorded by Routh [36]
Dickinson [18]		M.(1)	Vertex	Cæsarean section	L.	L.	
Gilles [23]		P.	Vertex	Cæsarean section	L.	L.	Ring incised during the operation
Holden [29]		P.	Brow	Cæsarean section	L.	L.	Ring incised during the operation
Jardine [30]		M.(4)	Vertex	Cæsarean section	L.	L.	
Phillips [28]	(*a*)	M.(2)	Transverse	Cæsarean section	D.	L.	Transuterine embryotomy required in both cases before the child could be delivered; both recorded by Routh, also by Holland
	(*b*)	M.(11)	Transverse	Cæsarean section	D.	L.	
Watt [18]	(*a*)	P.	Vertex	Cæsarean section	L.	D.	In both cases the patient died of sepsis; in both forceps failed to deliver, and in both the ring required incision and persisted after delivery of the child. Recorded by Dickinson
	(*b*)	P.	Vertex	Cæsarean section	L.	D.	
Boquel [6]		M.(12)	Transverse	Cæsarean section and subtotal hysterectomy	L.	L.	Child died of meningeal hæmorrhage the same day
Duchamp [19]		P.	Vertex	Cæsarean section and vaginal hysterectomy	L.	L.	Ring required incision
Gauhud [22]	(*a*)	M.(9)	Transverse	Embryotomy and hysterectomy	D.	L.	The uterus was ruptured during embryotomy and then treated by hysterectomy
	(*b*)	M.(1)	Transverse	Porro	Macerated	L.	Uterine contents infected; quoted by Dickinson
Rudaux [37]		P.	Transverse	Porro	Macerated	D.	Mother died on seventh day of peritonitis
Sinnetamby [39]		M.(1)	Transverse	Cæsarean section and hysterectomy	L.	D.	Mother died after thirty-four hours
Andrews [1]		M.(2)	Vertex	Partial embryotomy and excision of gravid uterus	Macerated	D.	Death from exhaustion after difficult embryotomy
White		M.(6)	Transverse	Excision of gravid uterus	D.	L.	Specimens Nos. 583*a*, *b* and *c*, University College Hospital Medical School Museum, London

REFERENCES.

[1] ANDREWS. *Proc. Roy. Soc. Med.*, 1912 (Obstet. Sect.), v, p. 341.
[2] ANDREWS and MAXWELL. *Ibid.*, 1908, i, pp. 138-50.
[3] BAR. *Bull. de la Soc. d'Obstét. de Par.*, 1905, viii, p. 59.

[4] Barbour. "Anatomy of Labour," 1899, p. 82.
[5] Blacker and Galabin. "Manual of Midwifery," 1910.
[6] Boquel. *Bull. de la Soc. d'Obstét. de Par.*, 1910, xiii, p. 306.
[7] Bovis, de. *Semaine méd.*, Par., 1903, xxiii, p. 157.
[8] Bowen. *Amer. Journ. of Obstet.*, New York, 1897, xxxvi, p. 96.
[9] Brindeau. *Bull. de la Soc. d'Obstét. de Par.*, 1898, i, pp. 270, 271.
[10] Budin. *L'Obstétrique*, Par., 1898, iii, p. 299.
[11] Bué. *L'Obstétrique*, Par., 1899, iv, p. 63.
[12] Chavane. *Bull. de la Soc. d'Obstét. de Par.*, 1898, i, p. 130.
[13] Chéron. "Des difficultés de la version causées par la retraction de l'anneau de Bandl," *Thèse de Par.*, 1899.
[14] Commandeur. *L'Obstétrique*, Par., 1899, iv, p. 461.
[15] Demelin. *Bull. de la Soc. d'Obstét. de Par.*, 1898, i, pp. 233, 271.
[16] *Idem. Ibid.*, 1900, iii, p. 40.
[17] *Idem. L'Obstétrique*, Par., 1898, iii, p. 49.
[18] Dickinson. *Surg., Gyn. and Obstet.*, Chicago, 1910, xi, pp. 377-91.
[19] Duchamps. *Loire médicale*, September 15, 1897 (*vide* Dickinson).
[20] Fabre and Dangat. *Bull. de la Soc. d'Obstét. de Par.*, 1909, xii, p. 157.
[21] Formichella. *Internat. Journ. of Surg.*, New York, 1912, xxv, p. 281.
[22] Gaulaud. *Bull. de l'Acad. de Méd.*, Par., 1897, xxxviii, p. 103.
[23] Gilles. *Compt. rend. de la Soc. d'Obstét. de Gyn. et de Pæd. de Par.*, 1910, xii, p. 110.
[24] Hahl. *Med. Review*, 1900, p. 189. This case was first published in *Finsk Läkaresällskapets Hand.*, 1900, p. 139, and later in the *Arch. f. Gyn.*, 1901, lxiii, p. 3. The descriptions are not identical.
[25] Hart. "Female Pelvic Anatomy," 1884, p. 64.
[26] Herman. "Difficult Labour," Lond., 1902, p. 130.
[27] Hicks. *Lancet*, 1906, i, p. 1312.
[28] Holland. *Journ. of Obstet. and Gyn. Brit. Emp.*, 1911, xix, p. 526.
[29] Holden. *Amer. Journ. of Obstet.*, New York, 1911, lxiii, p. 317.
[30] Jardine. *Journ. of Obstet. and Gyn. Brit. Emp.*, 1911, xx, p. 11.
[31] Lewis. *Amer. Journ. of Obstet.*, New York, 1886, xix, p. 35.
[32] Lusk. *Brit. Med. Journ.*, 1898, i, p. 1506.
[33] Maxwell. *Lancet*, 1910, ii, p. 306.
[34] Perret. *Bull. de la Soc. d'Obstét. de Par.*, 1900, iii, p. 40.
[35] Radcliffe. *Med. Record*, New York, 1882, xxii, p. 151.
[36] Routh. *Journ. of Obstet. and Gyn. Brit. Emp.*, 1911, xix, pp. 40, 120, 216.
[37] Rudaux. *Compt. rend. de la Soc. d'Obstét. de Gyn. et de Pæd. de Par.*, 1900, ii, p. 23.
[38] Schroeder. "Des Schwangere und Kreissende," p. 51 (*vide* Barbour).
[39] Sinnetamby. *Journ. of Obstet. and Gyn. Brit. Emp.*, 1909, xv, p. 114.
[40] Smith, T. C. *Amer. Journ. of Obstet.*, New York, 1882, xv, p. 294.
[41] Souter. *Australas. Med. Gaz.*, Sydney, 1906, xxv, p. 568.
[42] Spiegelberg. "Midwifery," 1888, ii, p. 21.
[43] Treub. Quoted by Bar, but reference not found.
[44] Vallois. *Bull. de la Soc. d'Obstét. de Par.*, 1904, vii, p. 313.
[45] Veit. *Bull. de la Soc. d'Obstét. de Par.*, 1899, ii, p. 207.
[46] Watt. Recorded by Dickinson.
[47] Willett. *Proc. Roy. Soc. Med.*, 1912 (Obstet. Sect.), v, p. 335.
[48] Williamson. *Ibid.*, p. 337.
[49] Zweifel. *Therap. Monatsh.*, Berl., 1909, xxiii, p. 129.

A Case of Hydrocephalus complicated by Eclampsia, Fibroids, and a Contraction Ring.

By Mrs. Florence Willey, M.D.

The patient was aged 37. She had miscarried once fifteen years ago, and there had been no subsequent pregnancy till the one here recorded. When seen in the out-patient department on May 23, 1912, in the seventh month of pregnancy, the child was presenting by the breech in the third position, and subperitoneal fibroids were felt at the left side of the fundus. The pelvic measurements were full size. There was slight œdema and some frequency of micturition at this time. The urine contained a slight cloud of albumin. There were no casts. The patient was dieted and given rest and salines, and the albumin disappeared in a few weeks. The quantity of urine passed at this time was practically normal.

The obstetric assistant was called on July 23, and found that the membranes had ruptured, but there were no pains. The liquor amnii continued to dribble away till August 2 (ten days later), when labour pains began at 10.30 p.m. It was a footling presentation, and the os was the size of a florin, and the fœtal heart 140. At 2.30 a.m. a foot was brought down, but no progress was made during the next two hours. At 5 a.m. the patient had a typical eclamptic fit followed by another at 5.20, and a third fit at 6 o'clock. The urine contained a thick cloud of albumin.

I saw the patient for the first time at 7 a.m. She was under the influence of chloroform. Pulse 130. The uterus was very large, and during contraction as well as relaxation was irregular in outline. No further advance had been made since the foot was brought down and it was decided to assist delivery. The patient was given ¼ gr. morphia hypodermically, and light chloroform anæsthesia was maintained. The legs, body, and arms of the child were easily delivered, but on passing the fingers of the left hand through the cervix it was found that the head could not advance, as there was a firm ring of contracted muscle surrounding the neck. The part of the uterus above the ring, however, alternately contracted and relaxed. The uterus was still abnormally large. Irregular fibroids were now clearly felt at the fundus, but there was also a large mass in the body of the uterus, the outline of which became obscured on contraction. It was difficult to decide whether this was due to a hydrocephalic head or to the presence of another fibroid plus the head. The cord had ceased to pulsate when the body of the child was delivered: the spinal canal was therefore punctured in the lower dorsal region, partly to confirm the diagnosis, and in case of hydrocephalus to reduce the size of the head. The cerebrospinal fluid flowed freely. Steady traction on the child was now kept up with the object of overcoming the contraction ring, and it was also an advantage because thereby the fluid flowed away more rapidly. In fifteen to twenty minutes the ring relaxed and a partially collapsed hydrocephalic head was easily delivered. The placenta and membranes followed almost immediately and the uterus contracted well. There was very little hæmorrhage.

The patient had two fits after delivery—at 7.50 a.m. and at 8.30 a.m. During the next twenty-four hours she was given repeated saline infusions *per rectum* and under the breasts, and alkaline infusion into a vein, with chloral hydrate and bromide four-hourly. The temperature rose to 101° F. on the following day and remained above 100° F. for three days. On the third day she became jaundiced, the discoloration lasting for twenty-four hours. The albumin gradually disappeared from the urine and was absent by the third day. From the fourth day onwards she made an uninterrupted recovery.

I venture to bring this case before the Section since it illustrates the usefulness of steady traction on the child in overcoming a contraction ring in the second stage of labour, and the aid of lumbar puncture in the diagnosis and treatment of hydrocephalus when diagnosis was obscured by the presence of fibroids and the ring, and treatment by perforation of the head was impossible.

DISCUSSION.

Dr. EDEN said that Mr. Clifford White's paper was a very valuable one, for it was the first attempt which had been made to formulate the anatomical and clinical distinctions between the contraction ring and the retraction ring. He thought that the contraction ring would now take a definite place in obstetric teaching, and it was gratifying to them to recognize the important part which had been taken by members of that Section in elucidating this very difficult subject. Dr. Russell Andrews, Dr. Maxwell, Dr. Williamson, Dr. Willett, and now Mr. Clifford White had all presented papers to the Section dealing with the contraction ring as it had come under their notice, and their contributions would be generally recognized as forming distinct advances in our knowledge. He had himself only seen two cases in which a contraction ring had formed: in both there had been prolonged instrumental interference, but the mechanical difficulty in each case was easily dealt with, as the body of the child was partly delivered and the retained portion could be broken up without difficulty.

Dr. ANDREWS congratulated Mr. Clifford White on his very able paper, and said that the distinction which he had drawn between contraction and retraction rings seemed to be the clearest and soundest that he had met. He had been interested to note that in the specimen shown by Mr. Clifford White the contraction ring had fitted into the groove at the back of the neck, and was much more marked on one side of the uterus than on the other. In his own case shown before the Section some years ago[1] Dr. Andrews had drawn attention to the fact that the ring fitted accurately into a groove on the body of the fœtus, and had suggested that this was the cause of the oblique direction that was taken by the contraction ring in many recorded cases.

Dr. GRIFFITH congratulated Mr. Clifford White on the admirable paper he had read. He was doubtful if it was quite wise to apply the terms "contraction" and "retraction" to these so-called rings, unless there was general agreement as to the exact meaning of retraction, which was doubtful. The retraction ring was merely the lower edge of the tightly contracted and thickened uterine wall. The contraction ring was a local contraction and thickening, limited to a small ring-like area in the wall of the uterus.

Dr. HANDFIELD-JONES narrated a case where a Cæsarean section had been necessary, owing to the retention of the fœtus by uterine contraction. In this case the uterus was divided into an upper and lower cavity by the contraction ring. In the lower cavity the head and one arm of the fœtus were contained, while the rest of the infant was situated in the upper section. It was necessary to divide the uterine wall through the obstruction ring before it was possible to remove the fœtus from the uterine cavity. The wall of the organ was not much thinner in the lower than in the upper segment of the uterus. He also drew attention to cases where a contraction ring was present in connexion with adherent placenta. He thought it was difficult to draw a hard and fast line between contraction rings and retraction rings.

Dr. WILLIAMSON said that he agreed entirely with the terms "contraction" and "retraction" rings as suggested by Mr. Clifford White. Unlike Dr. Griffith, he did not think that any great difficulty was encountered in attempting a definition of muscular contraction and retraction. The definitions he personally taught were these: "Contraction is a property of muscle in virtue of which it shortens and becomes tense; contraction is followed by relaxation, the muscle returning to its original length and losing its tenseness. In retraction the muscle shortens and becomes tense, but after losing its tenseness fails to return to its original length, and remains permanently shortened." Bearing in mind these definitions, contraction and retraction were proper terms to apply to the rings described. Dr. Williamson regretted that the term "active retention of the fœtus by the uterus" had been omitted from the paper; this term was suggested some months ago by Dr. Eardley Holland, and it expressed in an admirable fashion the condition produced during labour by the presence of a contraction ring. It was a term which ought to be preserved, for it gave an actual description of what happened without implying any theory of origin of the ring. It would be well if obstetricians would agree to employ this term to indicate the condition discussed to-night, for the many conflicting terms employed at present obscured the subject and led to much misconception. One method of treatment which had been employed had not been mentioned, but Dr. Williamson mentioned it only to condemn it: cases had been treated by internal division of the contraction ring; such treatment was dangerous in the extreme and ought never to be employed. There was very little to criticize in the admirable paper to which he had just listened, but he could not accept the final conclusion. If he understood Mr. White aright, it was advised that Cæsarean section should be performed in all cases and removal of the uterus if the child were dead. This conclusion was far too sweeping. A case recently recorded by Dr. Willett proved that in some instances these severe procedures were unnecessary and were therefore unjustifiable, though, of course, there remained a considerable number of cases in which Cæsarean section, with or without removal of the uterus, was the safest and best procedure.

---

[1] *Proceedings*, 1908, i, p. 145.

Dr. Abernethy Willett wished to add his congratulations to Mr. White on his interesting and instructive paper. He thought that the specimen showed that it would have been impossible to deliver the patient *per vaginam*, as the tightness of the ring must prevent reposition of either arm or leg. Traction from below was obviously only applicable when the "lie" of the child was longitudinal and the ring the only mechanical obstacle to delivery. He would like to ask Dr. Willey if she could say how far above the external os the ring was situated in her case.

Dr. Eardley Holland said, that although the true significance of the contraction ring was a modern conception, it had, nevertheless, not escaped the observation of Smellie, and he read out from "A Collection of Preternatural Cases and Observations in Midwifery," Smellie's account of a case he encountered in the year 1743. The account of this case was headed: "A laborious one: the Uterus contracted before the Shoulders of the Fœtus." At the present day we had a clear conception of the clinical differentiation between cases of contraction and cases of retraction rings, and Mr. White had admirably summarized in the table contained in the first part of his paper the views of those who had written on the subject. The important point now remaining to be studied was the exact anatomical site of the ring of contraction, whether it was at the os internum or above or below this point. The present specimen lent itself admirably to such an investigation, and Dr. Holland was disappointed that this had not been carried out. He noticed that small pieces for microscopical sections had been taken from the neighbourhood of the ring, but very little could be learned from these: the pressure of the fœtus always destroyed the histological details on the surface of the uterus in contact with it. Much, on the other hand, might be learned by making a large microscopical section, 4 in. or 5 in. in length, through the whole thickness of the uterine wall. In such a section isolated cervical glands or their remnants would be more likely of detection, and, what was even of more importance in marking the site of the os internum, the arrangement of the muscular fibres could be studied. This latter point he himself was engaged in investigating at the present time, and he hoped before long to present to the Section the description of a uterus taken from a woman who had died in the second stage of an obstructed labour, which he hoped would go a long way towards settling the controversy which still raged around the "lower uterine segment." In this specimen Dr. Holland had particularly avoided making frozen sections, but had hardened the uterus in 5 per cent. formalin for a few days before opening it, by which means the histological details had been well preserved. In all probability it would be shown that both contraction and retraction rings occurred at the same site in the uterus—viz., at the level of the os internum. If Mr. White cared to have such large sections made from his specimen, and would give Dr. Holland the requisite piece of uterine wall, he would have the sections cut on the large microtome he was in the habit of using at King's College.

The PRESIDENT (Dr. Amand Routh) heartily congratulated Mrs. Willey on the successful treatment of the numerous complications in her case. He also considered the Section fortunate in having had so admirable a paper from Mr. Clifford White. In listening to his numerous points in the differential diagnosis of contraction and retraction as unfolded in his paper, he felt that at last some real scientific distinctions between the two conditions were being evolved out of chaos, but somehow cases he could recall did not always fit into these differential grooves. He noticed that one of the points of differentiation in the table at the beginning of the paper was the readiness with which a retraction ring could be felt by abdominal palpation, and the difficulty of thus recognizing a contraction ring. Later on in the paper the author agreed that the retraction ring was very infrequently felt, so that this point of difference was not of great practical value. As regards the treatment of a *contraction* ring, where steady traction did not easily overcome the resistance, and the fœtus could not be reduced in size, as in Mrs. Willey's case of hydrocephalus, or Dr. Eden's case of fœtal ascites, he thought that if the child were living and the case "clean," abdominal Cæsarean section was indicated.

Miss ALDRICH-BLAKE asked the reader of the paper if, at the time of operation or subsequently, he had been able to settle the relation of the contraction ring to the internal os. It appeared to her probable that the ring was actually the internal os. Miss Aldrich-Blake said she did not practise midwifery, and had therefore no experience of these contractions at full term, but within the last year she had had a case of incomplete miscarriage in which membranes and placenta, with a good deal of organized blot-clot, were retained in the cervical canal, the internal os being almost completely contracted behind the mass, and the uterine cavity proper being found on further exploration to be small and almost empty. The external os was also quite small. The patient was a young married woman pregnant for the first time, who after a fright at three and a half months began to bleed *per vaginam*. The losses had been going on for five weeks with little pain up to the time of admission.

Mrs. WILLEY, in reply to Dr. Willett, said that she judged the contraction ring in her case was somewhere between 2 in. and 3 in. above the external os.

Mr. WHITE said, in reply to the President, that he had never been able to palpate a retraction ring through the abdominal wall, and knew that several of his colleagues also had not. It would be of interest to know the experiences of others in this respect. Dr. Eden's cases, again, showed the importance of manipulations and maceration of the fœtus as causal factors. In reply to Dr. Griffith, he thought the most important points in differentiating the two conditions were the lax wall below the ring, the comparative mobility of the presenting part, and the good general condition of the patient. The other question had been answered by the remarks made by Dr. Williamson. Regarding the question of treatment raised by the latter, he did not mean that removal of the uterus was necessary in any but septic cases. In clean cases the division of the ring by prolongation of the uterine incision had enabled the child to be successfully delivered by conservative Cæsarean section in at least five cases. But owing to the fact that in cases with a contraction ring embryotomy did not offer an easy means of delivery (as in cases of dystocia from contracted pelvis), it might be necessary to deliver *per abdomen*, even when the uterus was infected, and then it was safer to remove the septic uterus either before or after the extraction of the child. He had not mentioned Dr. Holland's expressive term, as the condition was already described in the literature under at least seven different names (ring of Müller, Schroeder, Bandl, hour-glass contraction, retraction ring, contraction ring, close application of the uterine wall to the fœtus), and new nomenclature would only add to the confusion, especially as in all recently published cases, both in England and America, the term "contraction ring" had become well established. In reply to Dr. Handfield-Jones regarding adherent placenta, he believed that the majority of cases of so-called adherent placenta were in reality slight cases of contraction ring, for the following reason: The number of cases on the University College Hospital Maternity District requiring manual removal had been seventeen to twenty per annum, but for the last three years very firm continuous pressure on the fundus under full anæsthesia had been tried in every case, and the number of removals by hand had fallen to three or four each year. He was much interested in Smellie's case which Dr. Holland had read; the earliest case he had found was fifty years later. He had made many sections in different places to try to get histological details, but owing to gaseous decomposition of the fœtus it had been necessary to inject 40 per cent. formalin to stop the putrefaction spreading in so large a specimen, and all histological detail in the lining had been destroyed. This would apply equally to a large section as to many small ones. For similar reasons he regretted that he was unable to answer Miss Aldrich-Blake's question about the internal os. He congratulated Mrs. Willey on the success she had had with continuous traction in her difficult case.

Obstetrical and Gynæcological Section.

January 2, 1913.

Dr. Amand Routh, President of the Section, in the Chair.

Intra-uterine Nodule of Embryonic Origin resembling Osteochondroma.

By Cuthbert Lockyer, F.R.C.S.

Last October (1912), Professor Coe, of New York, came over to London to operate upon a patient of his, and he brought me the specimen which he removed from the uterus for examination and report. As the tissue is quite unlike anything I have seen in connexion with the pathology of the human uterus, I thought it would interest the members of this Section, to one or two of whom I have previously shown the slides. Dr. Coe has kindly consented to my showing the microscopic sections, and has sent me the following history from America:—

Mrs. X., aged 38, married seventeen years; four children, the eldest aged 16. The first labour was instrumental, the others spontaneous. There is a laceration of the cervix and a relaxed pelvic floor. Six years ago (before the birth of the last child) patient missed five periods and thought she was pregnant; examination under anæsthesia revealed a normal uterus of 2½ in. sound measurement. Two months later menstruation was again resumed, and the patient was treated in Paris for endometritis. The periods again ceased for five months, and a diagnosis of ovarian cyst was made by a Paris doctor, who also advised an operation. This advice the patient refused to follow, because she felt sure she was pregnant; and this proved to be the case, a normal labour at term following. For two years after the birth of her last child the periods were again regular, then a cast of the uterine cavity was expelled after two months of amenorrhœa. Microscopic examination of the cast and of curettings obtained by exploration proved the presence of chorionic villi. A second abortion followed one year later, at the second month of gestation. The patient was then curetted for retained products and the pelvic organs were found to be normal; subsequently menstruation continued regularly until August, 1912, since when there has been amenorrhœa, but the patient has felt perfectly well. There has been no leucorrhœal discharge. The lady considered herself to be pregnant, but on examination on October 31, 1912, the uterus appeared to be small and hard. An anæsthetic was given; the cavity measured 2½ in. The adnexa were normal. With a sharp curette Dr. Coe removed a few fragments of hyperplastic endometrium and also what he describes as a round, calcareous mass, the size of a small marble, from the cavity in the region of the left cornu uteri. "As

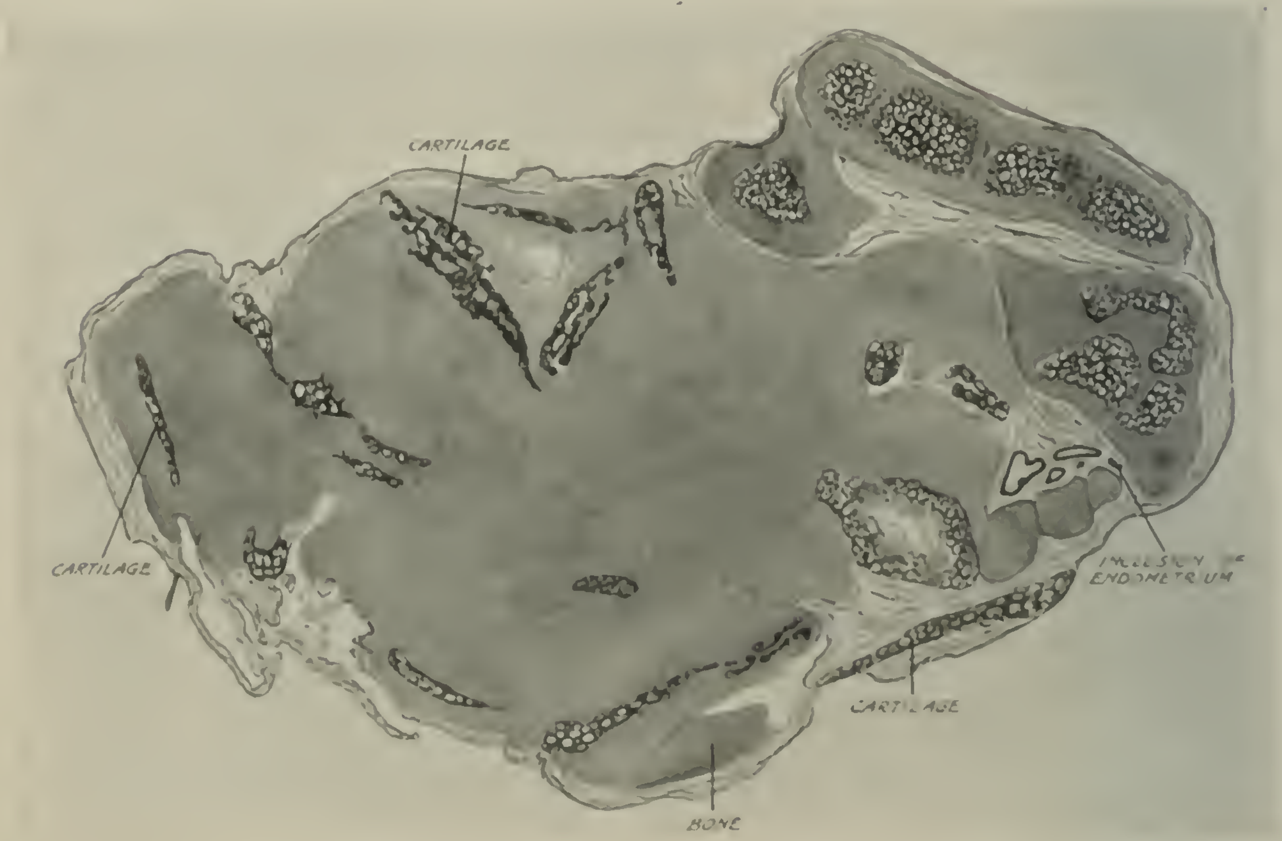


Fig. 1.

Complete scheme of the specimen removed by Dr. Coe. Note the peripheral arrangement of the cartilage.

the curette passed over the posterior wall of the uterus a peculiar gritty sensation was felt, suggesting a calcareous deposit, but no lime salts came away. The bleeding was unusually slight. Convalescence normal."

In bringing this specimen to me Dr. Coe said: "You may find it to be a small calcified ovum," and this was certainly probable from its size and shape. It was a hard, oval body, whitish in colour, and sounded like bone when struck by the handle of a knife. It measured 15 mm. long by 7 mm. in width, and was 3 mm. thick; with these dimensions it formed a discoid body not unlike a tiny cameo. The

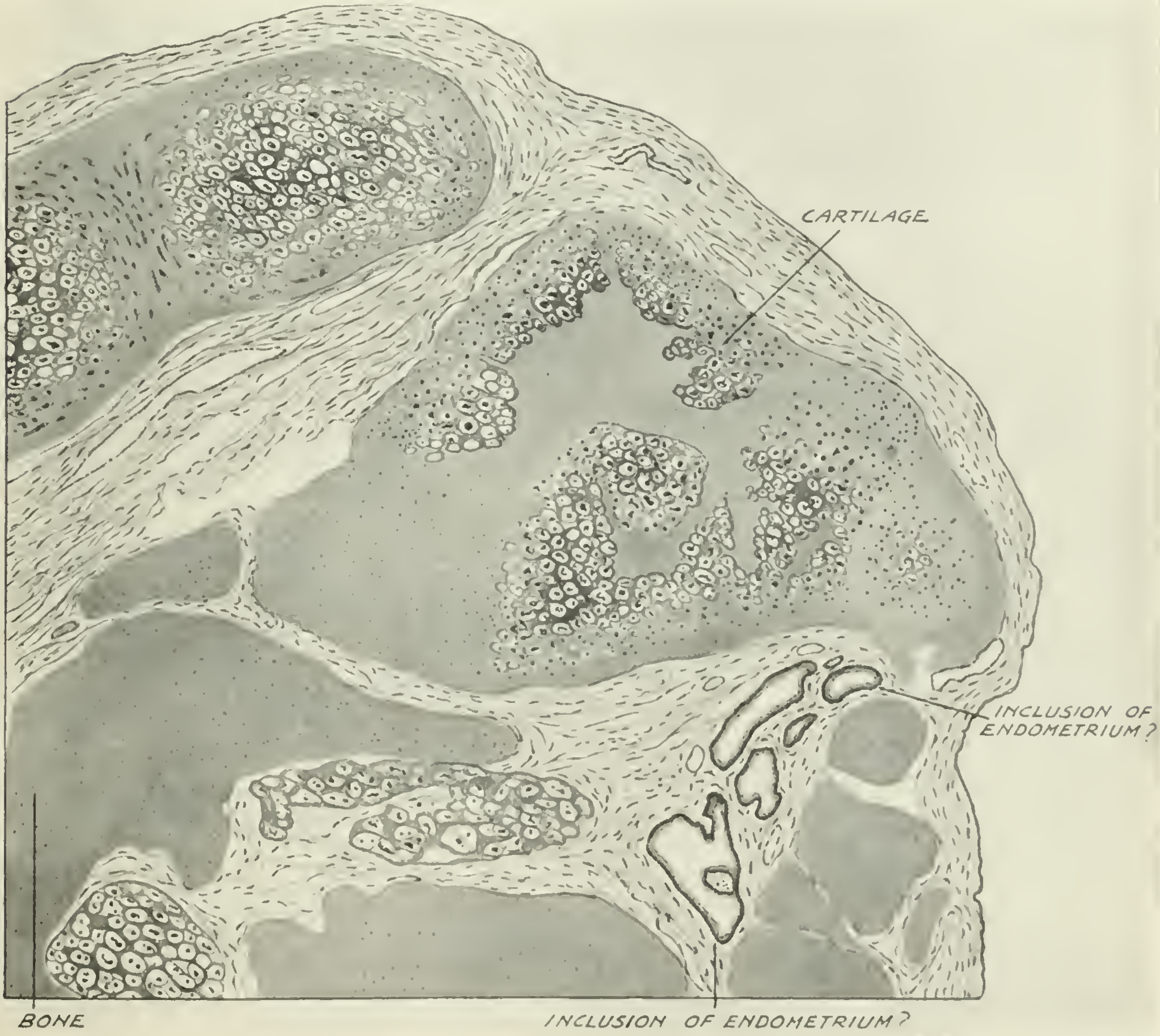


FIG. 2.

Portion of fig. 1 under a 1-in. objective.

sections for examination have been taken through the flat surface—i.e., parallel to its greater length and width. The tissue was decalcified, passed through spirit and xylol, and embedded in paraffin wax. The stains are logwood and eosin.

The section shows an abundance of hyaline cartilage arranged in oval, solid plates and long, irregular ribbons or tongues, having a peripheral situation for the most part. These cartilaginous areas are surrounded by dense, compact bone and hyaline fibrous tissue. In the latter are also seen (at one point only) a few follicles of glandular tissue having all the appearances of endometrium. So that under one field of the microscope can be seen cartilage, bone, and tissue undistinguishable from that of the lining membrane of the uterus. It is quite possible that the endometrium may have dipped down into a sulcus in the specimen and become included in the section without the point of entry showing in the cut section. If, however, we can accept the view that such mesoblastic, fully formed tissues can arise from the connective tissue elements of the uterine mucous membrane, the preservation of a piece of the latter as an inclusion in the growth is not to be wondered at. If this specimen is looked upon as of fœtal origin and as having been left behind after the last abortion, several clinical as well as histological difficulties arise. The patient never suffered from menorrhagia nor was the uterus subinvoluted such as it would be expected to be with retained products. The three months' amenorrhœa prior to the removal of the specimen was thought to be due to gestation, but no decidua, nor chorionic villi, were discovered and the uterus was small and hard. Coming to the question of histology, there is no definite arrangement of the fully formed tissues, they do not correspond to any part of a fœtus, but they do resemble the erratic formations found in neoplasms in the lower animals—such as, for example, in the breast tumours of a bitch, in which cartilage and bone are not infrequent.

I trust the specimen will be referred to the Pathology Committee in this Section for a collective opinion.

N.B.—Dr. Coe writes under date December 17, 1912, to say that "the period appeared at the proper time four weeks after the operation and was quite normal. The patient is in excellent health."

Mr. Shattock has examined the specimen and is doubtful whether the tumour is a true neoplasm of the nature of an osteochondroma (he has seen an enchondroma in the submucous tissue which may be an early form), or if it is a teratoma from imperfect segmentation of an ovum—the segmental arrangement of cartilage looks embryonic—but the epithelial ingrowths have no muscular coat; they look as if they were ingrowths of uterine epithelium.

Dr. Arthur Keith is of opinion that it may be the product of an ovum—one of the fruits that result from an artificial stimulation of the ovum, which has replaced the normal spermatozoal stimulus.

Report of the Pathology Committee (January 10, 1913).—"We have examined the section submitted by Dr. Lockyer, and are of opinion that the specimen consisted of irregular masses of cartilage and cancellous bone surrounded by fibrous tissue. There are a few irregular tubules lined by a single layer of columnar epithelium lying in loose connective tissue. These tubules may be either included maternal endometrium or of embryonic origin. In our opinion the specimen is embryonic and may be a relic of a previous pregnancy."

DISCUSSION.

Dr. ARTHUR GILES said that he was greatly interested in this specimen; to his mind it was strongly suggestive of an early monstrosity of the type of fœtus acardiacus amorphus. Some years ago a good specimen of this malformation was shown to the Obstetrical Society of London. It resembled merely a lump of flesh with the foot protruding. The present specimen might very well be an instance of a very early monstrosity of the same type. As far as he knew an osteochondroma of the uterus was not known, and in any case it was so rare that, a priori, the possibilities were all in favour of this specimen being of fœtal rather than uterine origin.

Dr. LOCKYER, in reply, stated that he would have no objection to changing the title of this specimen[1]; the idea of a lithopædion had occurred to him. Dr. Giles's view as to the nature of this curious specimen was also interesting.

Enormous Renal Cyst.

By CUTHBERT LOCKYER, F.R.C.S.

ABDOMINAL tumours and cysts of enormous dimensions are far less commonly met with at the present time than was the case some ten or fifteen years ago. The reason for this is no doubt to be found in the comparative safety of modern surgery and the consequent increased frequency of operations. In my experience these neglected cases generally come from country districts, where the old prejudice against operations still remains. The following case has a history of eighteen years' duration:—

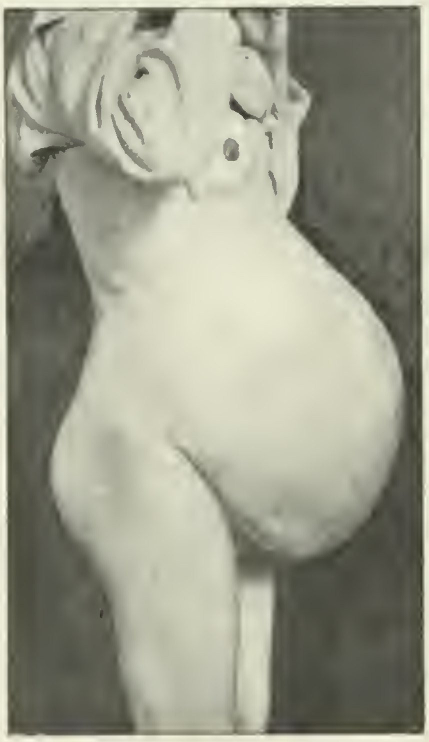
---

[1] The original title was "Osteochondroma of the Uterus."

Mrs. E. F., aged 45, multipara, was sent to me by Dr. Hall, of Hertford, on June 28, 1912, and she gave the following history: Always strong and healthy; eight children alive and well, youngest being aged 3 and the eldest 21. Eighteen years ago she was attended by a midwife in her third confinement. After a normal labour the nurse called in Dr. Hall because of the size of the abdomen. He diagnosed an ovarian cyst and the patient was admitted into Hertford Infirmary, where she was advised to go into a London hospital; this she did not do. There have been five children subsequently born to her. She described the labours as difficult, but in Dr. Hall's letter to me he mentions no trouble in the confinements. The tumour has steadily increased in size, but gave rise to no serious trouble until a fortnight before I saw the patient. The first complaint was pain in the lower part of the abdomen, and the patient noticed what she took to be a second swelling at the most dependent part of the abdominal tumour. This prevented her from stooping, and it decided her on the question of at last submitting to operation. There has never been any trouble with the act of micturition. The bowels were quite regular and appetite good. Menstruation regular, twenty-eight-day type, lasting five to six days; loss never profuse; occasionally there was slight leucorrhœa.

On examination the abdomen was very distended and tense, presenting well-marked striæ. There was a second swelling overlying the pubes, and extending on to the thighs, of boggy consistence, and caused by œdema of the parietes. The circumference of the abdomen at the umbilical level was 46½ in. The abdominal swelling gave a well-marked fluid thrill; it was dull all over, excepting for the left side below the umbilicus, where, in the left iliac region, there was a resonant area. *Per vaginam*, the cervix was normal and freely movable: the fornices were empty, but bimanual examination was, of course, impossible. Circulatory and respiratory systems quite normal.

Operation was performed on July 1, 1912; scopolamine, morphine and atropine given one hour previously. Photographs were taken before I explored the cyst and after the latter was laid bare. After full exposure by a long incision it was found that the cyst was retroperitoneal and very adherent. The cæcum, appendix, and ascending colon had been carried right over to the left side and were adherent to the cyst in the left flank and ascended on the side of the cyst from above downwards. The large veins of the right mesocolon stretched across the front of the cyst. On separating the adhesions during enucleation the thin wall ruptured and a quantity of turbid, yellowish-green fluid escaped, but 22 pints were collected. It was estimated that about 3 pints were lost. The mesocolic vessels were tied off with catgut and the bowel separated. It was soon found that the right ureter was continuous with the cyst and this was severed a few inches from the bladder. In the upper pole of the cyst was found a flattened mass of kidney substance. The uterus and ovaries were normal. Eight pints of saline were poured into the abdominal cavity and the abdominal wound closed in layers. The patient stood the operation well and was put to bed with a pulse of 88 beats per minute and of good volume.



Enormous renal cyst.

The temperature reached 101° F. on the evenings of the second and third days, and 100° F. on the evenings of the next four days, after which it varied between 99° F. and normal. On the fourth day the bladder was found above the umbilicus and 78 oz. of urine were drawn off. There was slight suppuration of the skin area of the abdominal wound. It was three weeks before the patient could dispense with the catheter. The daily amount of urine varied from 20 oz. to 60 oz. The patient left hospital on the thirtieth day after operation: the wound had long since healed.

The specimen has shrunk very considerably by immersion in Kaiserling's fluid. It presents a very ragged exterior to which there are large masses of retroperitoneal fat adherent. It is divided by septa into three loculi, one large, dependent lower loculus and two upper. On the posterior and inner wall of one of the upper loculi is situated a flattened mass of renal substance, and to this is attached the ureter. The latter is slightly enlarged and thickened. The close relation of the kidney substance to the commencement of the ureter excludes the possibility of this cyst being a hydronephrosis. I am showing a smaller renal cyst which presents the same relations as regards the remaining kidney substance and ureter. It has been my experience to find renal cysts start more often in the upper pole of the kidney than in the lower, but in the specimen shown to-night it is not possible to say in what part of the kidney the cyst arose.

DISCUSSION.

Mr. MALCOLM said that both the specimens shown seemed to him to be examples of hydronephrosis. He had recently operated upon a patient,[1] rather more than half of whose right kidney, including its pelvis, was of normal shape. The other part was of somewhat larger bulk, being in a cystic condition, with very thin walls and showing the lobulated form characteristic of a hydronephrosis. A calculus was found at the juncture of the healthy with the dilated part, and this was the obvious cause of the distension of the calices of one end of the kidney. The ureter communicated freely with the pelvis and through it with the normal portions of the renal tissue. The presence of a piece of healthy kidney and the complete or incomplete exclusion of a cystic part from communication with the ureter were characteristic conditions of a partial hydronephrosis. With reference to the diagnosis, the speaker had seen a number of cases of hydronephrotic kidney big enough to simulate ovarian tumours. The important point in the distinguishing characters of these cases was that such a large kidney was always associated with an absolutely dull percussion note all over the posterior portion of the loin of the affected side. When this sign was found, even if the pouch of Douglas was distended, the abnormal condition was almost certainly of renal origin or, at least, had developed from the loin behind the colon.

---

[1] See *Proceedings* (present number), Clin. Sect., pp. 86-88.

Dr. LOCKYER, in reply to Mr. Malcolm's statement that the two specimens of renal cyst were, in his opinion, examples of hydronephrosis, considered that the fact of the ureters being undilated and running into the renal tissue and having no connexion with the cyst, was a fair proof that the latter were not hydronephroses but true renal cysts.[1]

Endocervical Cancer with Distension of the Corpus Uteri and Extensive Thinning of its Walls.

By THOMAS WATTS EDEN, M.D.

THE patient was a married woman, aged 65. She had one child thirty-four years ago, and her monthly periods ceased at the age of 50. She was quite well until August, 1912, when slight vaginal bleeding occurred, lasting for four days. After this there was no further bleeding, and no discharge of any kind until the end of September, when slight bleeding recurred and continued without cessation until her admission to the Chelsea Hospital for Women on December 3, 1912. The bleeding was bright in colour. She had had no pain whatever, but she thought she had lost flesh a little during the last few weeks. Her general condition was good, and temperature and pulse were normal.

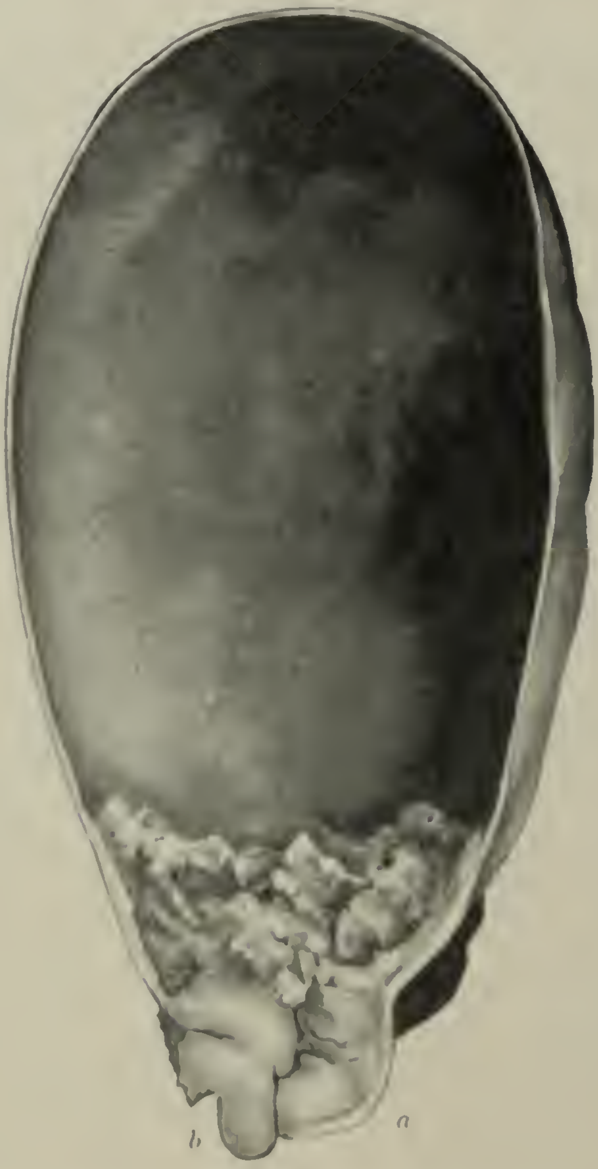
On vaginal examination the vaginal portion of the cervix was found atrophied, but of good mobility and otherwise healthy; the body of the uterus was symmetrically enlarged and of elastic consistence; it appeared to be about the size of the fœtal skull. The sound was not passed. There was slight bleeding from within the cervix during the examination. The case was thought to be one of malignant disease of the body of the uterus, possibly associated with pyometra, and on December 5 abdominal panhysterectomy was performed, without dissecting out the ureters. The omentum was adherent on each side to the uterine cornu and the proximal part of the tube, and the tubes and ovaries were densely adherent to the back of the broad ligament. Several small soft glands were removed on each side of the pelvis. The vagina was closed and no drainage used. During the second week of convalescence a mild cystitis appeared, which was found to be due to

---

[1] Injection of the ureter with gentian violet caused distension of the renal pelvis, but there was no escape of the coloured fluid into either loculus of the cyst. The renal pelvis takes no part in the formation of the cyst, thus proving that the multilocular cyst is not a hydronephrosis.—C. L.

Bacillus coli infection, but by the end of the third week this had practically disappeared, and there was no further delay in her recovery.

The uterus was hardened before being opened, and the size and shape of the dilated uterine body are fairly well preserved in the specimen.



Endocervical cancer with distension of the corpus uteri ; *a*, *b*, healthy vaginal surface of cervix.

It will be seen from the drawing that the disease has originated in the cervical mucosa above the level of the external os, which is free ; it has also spread over the inner surface of the body for a considerable distance above the internal os, more extensively on the right side than the left. The uterine wall is greatly thinned by stretching ; in parts it is translucent, and resembles in appearance the wall of an ovarian cyst. The cavity of the corpus uteri is greatly distended and its walls are extensively thinned; for a great part of its extent the wall is no thicker than brown paper and is translucent to light like the wall of an ovarian cyst. This constitutes the most striking feature of the case and is most uncommon in cases of uterine distension; so far as the author's knowledge went he had never before seen a specimen like it.

Microscopically the growth was a typical columnar-celled adenocarcinoma.

Mr. Glendining, the Pathologist to the Hospital, sent the following note on the fluid contents of the uterus: "The uterus was opened after four days' fixation in Foa's solution. The fluid contents were of a greenish-brown colour and of thin mucoid consistency. After standing, the deposit was examined and found to contain epithelial débris, but no pus cells and no micro-organisms." The amount of the fluid was not measured.

DISCUSSION.

Dr. HANDFIELD-JONES quite agreed with Dr. Eden that the development of cancer in the cervical region was of comparatively recent origin, and that the dilatation and atrophy of the uterine wall were dependent on insufficient surgical drainage through the stenosed cervical canal. He quoted a case of a woman, aged 60, who had been under his care owing to a foul-smelling vaginal discharge. On examination the cervix was found to have undergone senile atrophy, and the cervical canal to have become nearly closed. The cavity of the body was dilated so that it held 4 to 5 oz. of pent-up purulent fluid, and the uterine wall itself had become stretched and atrophied, as in the case shown by Dr. Eden. When the cervical canal was dilated and the uterus thoroughly drained all symptoms ceased.

The PRESIDENT (Dr. Amand Routh) said that many cases of pyometra had been described associated with carcinoma of the cervix, and what was rather remarkable, several of these cases had a patent cervix and yet no pus had come away. This was analogous to the patent opening of a hydrosalpinx into the uterine cavity.

Uterine Mole showing Low Implantation of the Ovum (Placenta Prævia).

By Thomas Watts Eden, M.D.

M. C., aged 24, a bipara, came up to the Casualty Department of Charing Cross Hospital on November 16, 1912. She had missed two monthly periods, having last menstruated on August 24, and for a week she had had slight vaginal bleeding. After lifting a heavy weight on the previous day the hæmorrhage increased, and she showed marked signs of loss of blood when first seen. She was admitted, and on examination it was found that the uterus was enlarged to the size of a three months' pregnancy, and several large clots were removed from the vagina; the cervix was soft and the internal os admitted the index-finger. She was kept in bed and treated with hot douching and full doses of ergot. There was no more hæmorrhage, and four days after admission the mole shown was expelled spontaneously. The uterus was douched and the patient left the hospital eight days later.

The specimen consists of a recent blood mole which has been cut into halves. In the centre is the intact amniotic sac; the outer wall is composed of the decidual investment, so that the bleeding has occurred into the chorio-decidual space. The mole is pyriform in shape, and at the lower end is a narrow, cone-shaped process which obviously corresponds with the upper part of the cervical canal. With this portion the ovum is directly continuous, and the decidual space, which is roughly crescentic in outline, lies above the ovum and obviously corresponds with the fundus of the uterus. Apparently the fertilized ovum, in this case, passed from the mouth of the Fallopian tube into the lower part of the uterine cavity and became implanted very near the internal os; the type of placentation would thus have been placenta prævia basalis if the ovum had continued long enough for a placenta to have become formed.

Low implantation of the ovum in the early months of gestation probably does not greatly affect the security of its attachments, and it is doubtful whether the bleeding can be attributed to this cause. It is, however, interesting to note what would occur in such a case if bleeding took place into the decidual cavity; escape of the blood from this position would be impossible through the cervix, and its retention, with consequent rise of intra-uterine tension, would probably lead to abortion without delay. When the implantation of the ovum is normal the decidual cavity is readily drained through the cervix, and considerable decidual bleeding is thus consistent with the continuance of pregnancy. There is no evidence, however, that decidual hæmorrhage occurred in this case.

Dr. GRIFFITH had shown a similar specimen, which is in the Museum at St. Bartholomew's Hospital.[1]

Foreign Bodies removed from the Peritoneal Cavity.

By H. RUSSELL ANDREWS, M.D.

ON November 21 I was asked to see a patient who was said to be three months pregnant. A metal dilator had been passed into the uterus and had disappeared. I said that if she was sent into a nursing home I would look after her. I saw her in the nursing home in the evening—a nullipara, aged 28. She looked worried and ill, and complained of pain in the left iliac fossa. The uterus could not be felt on abdominal examination. She was then anæsthetized. On making a bimanual examination it was found that the uterus was not enlarged. A small, hard foreign body could be felt curled up in Douglas's pouch. An incision was made through the posterior fornix, and a very brittle bougie, 8 in. long, was removed in fragments, partly with the finger, and partly with a pair of sponge-holders. The finger, passed into the peritoneal cavity, felt a hole in the fundus of the uterus, through which No. 3 Hegar's dilator passed easily. The tubes and ovaries were slightly adherent to the back of the uterus. Bimanual examination failed to reveal the presence of any other foreign body.

I tried, without success, to communicate by telephone with the patient's previous attendant. As he had been much agitated at his interview with me, and had not given me a very clear account of what had been done, I did not feel justified in opening the abdomen without further evidence, so the patient was put back to bed with the head of the bed propped up, with the idea of helping any foreign body that might be in the abdomen to gravitate into Douglas's pouch. I heard next evening, by letter, that a celluloid bougie had been passed into the uterus on October 17. It was removed on October 19, but 8 in. broke off. The attendant said that this fact had not caused him anxiety, as he thought that the bougie would be absorbed, "being made of cotton-wool." On November 7 an attempt at dilatation with metal dilators was abandoned as the uterus seemed to be empty. On November 21 another attempt at dilatation with metal dilators had been made without an anæsthetic. All went well until No. 8 was passed. The attendant turned round to pick up No. 9, and then found that No. 8 was no longer visible. After an ineffectual search for it on the floor he concluded that it must have slipped entirely into the uterus. As the instrument measured 9 in. this was rather a stretch of the imagination.

---

[1] See *Trans. Obstet. Soc. Lond.* (1893), 1894, xxxv, p. 37.

After this further information I had an X-ray photograph taken on November 23. A long, narrow shadow was seen to the right of the middle line, nearer the front of the abdomen than the back. On the afternoon of the same day I opened the abdomen by a small median incision. Dr. Maxwell kindly assisted me. Before the peritoneum was cut through a foreign body could be felt lying almost vertically to the right of the middle line, just under the peritoneum, its lower end being 4 in. below the umbilicus. A small incision was made in the peritoneum, and the lower end of the dilator was coaxed out with the finger-tip, and then pulled out with the forceps. The coils of intestine were stuck together by a small amount of exudation. The dilator No. 7 on one side, No. 8 on the other, measured 9 in. long. As not more than 4 in. had been below the umbilicus the upper end must have been lying near the liver. The patient made an uninterrupted recovery.

I made inquiries as to the method of sterilization of the celluloid bougie, and was told that as far as could be remembered it had been sterilized with cyllin.

I thought that this unusual case, in which a foreign body had been retained in the peritoneal cavity for five weeks, was of sufficient interest to bring before the Section.

Portion of Bone Knitting Needle, used to procure Abortion, removed by Operation from Abdominal Cavity; Development of a Pelvic Abscess, Fæcal Fistula, Septic Pyelonephritis, and General Septic Infection, with ultimate Recovery.

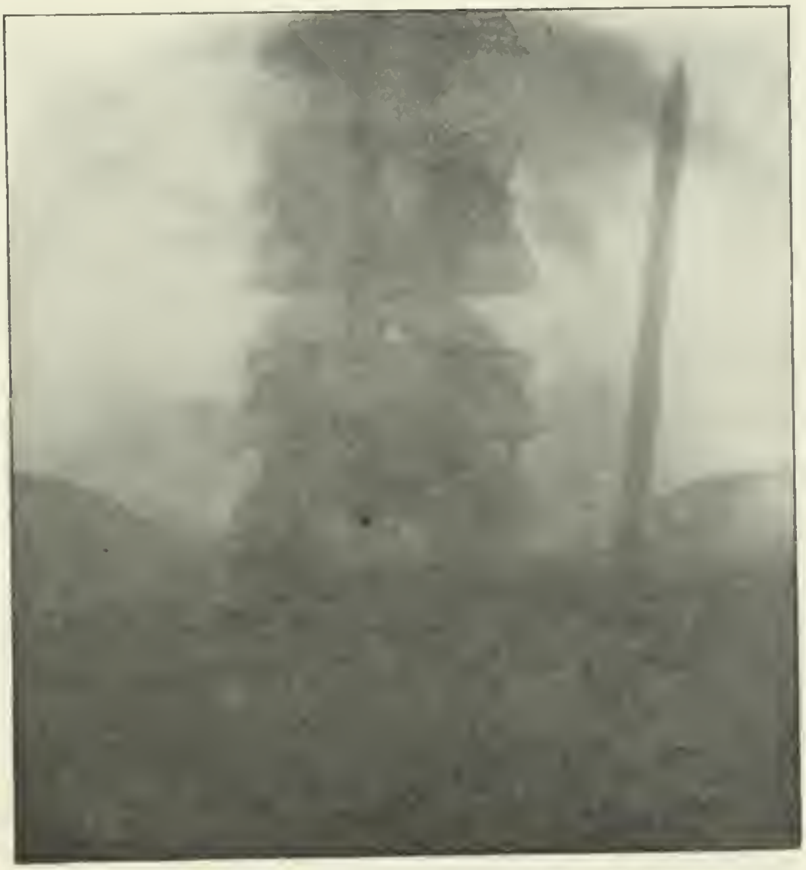
By G. BLACKER, M.D.

J. I., SINGLE, aged 29, a primipara, on December 9, 1911, was admitted to the Great Northern Hospital with the history that her periods, which were as a rule regular, had not occurred since the end of September. In the afternoon of the day before her admission she had attempted to pass into the uterus a bone knitting needle some 10 in. in length, for the purpose of procuring abortion. During the attempt the needle broke off short, leaving about half of it inside her body. Great pain occurred at the time and this had continued since in the lower part of the abdomen and down the right leg.

On her admission to the hospital the temperature was 99·6° F., and the pulse-rate 104. The abdomen was somewhat distended and tender on palpation over its lower half. The enlarged uterus could be felt rising up the umbilicus. On vaginal examination the cervix was somewhat softened; the canal admitted the last phalanx of the index-finger and there was an old laceration of the anterior lip. Marked tenderness was present in both lateral fornices, but no foreign body could be felt either by the vagina or by the rectum. On examination with a speculum a small laceration was seen to the right of the middle line in the posterior fornix, and there was a recent abrasion on the anterior lip of the cervix. There was no bleeding from the uterus. There was no blood in the urine, but a body reducing Fehling's solution was present—probably lactose. An X-ray photograph was ordered to be taken, but there was some unavoidable delay in getting this done. During the next four days the temperature gradually rose, until on the fifth day after admission it was 102·2° F., and the pulse-rate 100. On the evening of this day uterine hæmorrhage occurred, accompanied by uterine pains, and at 6.30 next morning the patient aborted, a fœtus some 4 in. in length coming away, followed almost immediately by the placenta. At 9 a.m. abdominal section was performed with the patient in the

Trendelenburg position. On opening the peritoneum very offensive pus welled up from Douglas's pouch. The table was lowered to the horizontal position, the rest of the abdominal cavity packed off, and the hand passed down into the true pelvis. The sharp lower end of the needle could now be felt projecting under the peritoneum about 1 in. to the right of and about the level of the sacral promontory (*see* figure). With some little difficulty it was extracted, the peritoneum having to be slit up over it for a distance of about 1½ in. The needle had just missed the right border of the rectum, the wall of the bowel being slightly torn superficially, and the broken off portion, measuring 6½ in. in length, lay embedded under the peritoneum, its upper end reaching to just above the lower border of the second lumbar vertebra. The pelvic cavity was carefully cleansed, a pair of forceps passed into Douglas's pouch from the vagina, and an iodoform gauze drain drawn down into the vagina from Douglas's pouch. A similar gauze drain was inserted passing from the site of the tear in the parietal peritoneum to the lower angle of the abdominal wound. The rest of the incision was closed with all-through silkworm-gut sutures, mattress silkworm-gut sutures for the fascia, and a continuous horse-hair suture for the skin. The uterus was curetted with a brush curette and its cavity packed with iodoform gauze. The vaginal drain was removed on the fifth day and a drainage-tube substituted for the abdominal drain at the end of the first week.

For the first fourteen days after the operation the temperature varied between 99° and 101° F., and during this period there was a profuse discharge of pus from the wounds. During the third week the temperature fell almost to normal, but about the end of the week it rose again and remained elevated for some six days. On the thirty-eighth day after the operation the temperature again began to rise, and at this time fæcal matter was found to be coming from the abdominal wound. As the temperature remained persistently elevated during the next twelve days, varying between 100° and 103° F., it was decided to examine the patient under an anæsthetic, as it was thought possible that a perinephritic abscess was present. The examination, however, failed to reveal any collection of pus, and after the vaginal wound had been dilated the small cavity present in the pelvis was thoroughly irrigated. After the exploratory examination, for some little time, the patient's general condition was very grave. The pulse-rate varied between 110 and 140 and was of low tension. For some days there was incontinence of urine and fæces, and she took her nourishment very badly. However, she gradually recovered, and as the urine was found to contain a pure culture of the *Bacillus coli*, on the sixtieth day after the first operation a dose of an autogenous vaccine of 10 million organisms was injected. The day after this the temperature fell to normal and remained so for nine days, with the exception of a slight rise following the injection of another 10 million organisms five days after the first injection. On the sixty-ninth day another injection of 20 millions was given, and this was followed by the most marked reaction, the temperature remaining elevated for seven days, and on the fourth day after the injection reaching 104·4° F. After this the discharge gradually diminished in amount, the escape of fæcal matter ceased, and the wounds were soundly healed when the patient was discharged at the end of the twentieth week from the date of her admission. During the last six weeks of her stay in the hospital on two occasions there was a slight rise of temperature lasting one to two days, and on one occasion it was elevated for three days.



Skiagram showing the knitting needle lying to the right of the lumbar spine.

At the time of her dismissal the urine still contained a pure culture of the *Bacillus coli*, although she no longer had any urinary symptoms.

I thought this case of sufficient interest to bring before the Section because it is a good example of the desperate measures to which some women will resort in an endeavour to procure abortion. In the present case the patient in all probability failed to introduce the needle into the uterus and yet she aborted, but at the cost of a pelvic abscess, an ascending infection of the ureter and kidney, a fæcal fistula, and a severe attack of septic poisoning. I am inclined, however, to think that all these complications were in reality due to infection following on the injury to the rectum.

Dr. NEWNHAM brought forward a case of a similar description and showed a bone knitting needle removed from the peritoneal cavity of a patient home from Canada. Thinking herself pregnant about three months, she inserted the needle herself into the uterus (as she declares) and lost it. Dr. Newnham cleared out some débris of the abortion on the first day she was seen, but nothing else abnormal was felt. The temperature rising and remaining at 101° or 102° F. for a week, the pulse being 120, with great abdominal pain and discomfort, an X-ray photograph was taken and a distinct shadow was seen in the right iliac region. On July 16, 1911, Dr. Newnham opened the abdomen and found the intestines so matted together that it was quite impossible to separate them at any point. On pressing the hand deeply down on the position of the right broad ligament the end of the needle was gradually pushed through between two coils of intestines—this was seized, drawn out, and the abdomen at once closed. No drainage. The patient made quite a good recovery and has returned to Canada.

DISCUSSION.

Dr. ARTHUR GILES said that the introduction by women of foreign bodies into the uterus for the purpose of inducing abortion was probably more common than was generally supposed. A few months ago a woman came to the out-patient department of the Tottenham Hospital saying that she was a week or two over the time and that a neighbour had recommended her to introduce a hairpin to bring on the period; she went on to say that she had done so and that the hairpin had broken and part remained inside. On examination the end of the hairpin could just be felt within the external os. The patient was admitted, and under an anaesthetic the foreign body was easily removed with the forceps. One limb of the hairpin had broken off, leaving the hooked extremity, which retained the other limb, within the uterus. This patient happened to be more skilful, or more fortunate, than Dr. Blacker's in the matter of passing the foreign body into the uterus itself; it would have been a very easy matter for the hairpin to take another course and pass through the fornix into the abdominal cavity.

The PRESIDENT alluded to a post-mortem he had been asked to attend of a woman who had died of acute peritonitis and had believed she was pregnant. An armed Playfair probe was stated to have been passed into the uterus, and at the autopsy the small unimpregnated uterus was found to be retroflexed, and an elongated piece of cotton-wool was found in the utero-vesical pouch surrounded by purulent exudation. The uterus had been perforated at the angle of flexion and the wool had remained as the probe was withdrawn. There was also acute general peritonitis.

Dr. HEYWOOD SMITH said that between thirty and forty years ago he was sent for several times to see a lady who was suffering from alarming uterine hæmorrhage. She had been more skilful than the others they had heard of that night, as she used a knitting-needle which she directed into the os uteri. She was always quite punctual at her periods, so that whenever she had passed one she knew she was pregnant. She told Dr. Smith, subsequently, that she had, in that manner, brought on abortion thirty-five times.

Demonstration of Lighting of Operating Theatres.

By H. MACNAUGHTON-JONES, M.D.

DR. MACNAUGHTON-JONES gave an epidiascope demonstration of the most recent lighting of several of the principal theatres in the Frauenkliniks on the Continent, by means of the arc-light and reflecting mirrors. The advantages of the latter is that the light can be thrown in any direction and at any angle on to the operating table so as to illumine the pelvic cavity. The entering light may be reflected from six mirrors, two, or one. The lighting installation is arranged by Messrs. Carl Zeiss and Co., who are at present preparing a smaller apparatus for use where the more powerful installation is not required.

DISCUSSION.

Dr. EDEN said that last summer he had the opportunity of seeing this method of illumination in use in Freiburg, Tübingen, and Munich. He was greatly impressed with its many advantages; it was a steady, soft, reliable light, free from the heat and glare which necessarily accompanied the use of lamps held close to the field of operation. With the old indirect methods of illuminating theatres, the use of lamps placed close to the operator was unavoidable when working deeply in the pelvis, whereas the mirror method enabled one to throw an adequate beam of light directly into the pelvis, when the patient was lying in the Trendelenburg position. In London, where so much work had to be done in artificial light, the advantages of adopting this method appeared to be very great.

Dr. HERBERT SPENCER said he had been very much impressed with the value of this method of lighting the operating table when he was in Berlin last year. It was not, however, quite so free from drawbacks as Dr. Eden thought, several operators finding it advisable to use drab or green sheets on the abdomen to diminish the glare. This method of illumination was most valuable in the extended operation for cancer. He thought the single mirror was sufficient; multiple mirrors, while obviating shadows, were more complicated and expensive and increased the risk from dust. They were arranging to have the light installed at University College Hospital. They were all much indebted to Dr. Macnaughton-Jones for bringing before them so many photographs illustrating the various methods of mirror lighting.

Adenomyoma in the Recto-uterine and Recto-vaginal Septa.

By CUTHBERT LOCKYER, F.R.C.S.

NEW growths which can be definitely proved to arise in the connective tissue space which intervenes between the rectum on the one hand and the uterus and the vagina on the other must be extremely rare or else escape diagnosis. During my fifteen years' experience in the Out-patient Department of the Samaritan Hospital I can only recall two such cases. Dr. Wallace, of Liverpool, has told me of his experience with a similar case, and Mr. Clifford White states that three cases have come under observation during his term of office as Obstetric Registrar at University College Hospital, London. I can find no mention of such a condition in the forty-nine volumes of the Obstetrical Society of London.

The first case I saw was sent to me by Dr. Phillips, of Ealing. There was a teat-like projection in the right vaginal fornix; the vaginal skin covered it; there was no ulceration; the growth lay close to the cervix on the right side and was long enough to be palpable before the examining finger reached the vaginal cervix. There was no projection into the rectum in this case. No operation was performed.

The second case is the one shown to-night. The patient was sent to me by Dr. Lewis, of Kensington. Her complaint was vaginal hæmorrhage and pain. She was aged 35; married 18 years, sterile. Had led a single life for thirteen years. The periods had always been regular, but for twelve months the loss had been excessive, and particularly so for the last three months. There was great pain in the rectum and defæcation had become very difficult. The pain had been very severe for the past three months, and the patient felt as if "something prevented the bowels from moving." The pain was always worse at night. For several weeks the patient had been laid up in bed. The hæmorrhage for the past few weeks had been practically continuous, but there had never been any bleeding from the bowel. On examination, a curious hard mass was felt in the posterior vaginal fornix; it was definitely fixed to the supravaginal cervix and adhered to the pelvic floor. The vaginal cervix was normal. *Per rectum* the mass was found to project anteriorly into the lumen of the bowel, but the mucous membrane was intact over it. The case was examined by Mr. Malcolm and Dr. Roberts, but no definite diagnosis was made. It was very noticeable that although the vaginal cervix was normal the upper part of the posterior vaginal wall for the space of 1½ sq. in. was puckered and presented blue points like varicosities. The skin surface, however, was quite intact.

At the operation on November 28 I was assisted by Dr. Hubert Roberts and Mr. Roy. The patient was placed in the Trendelenburg position, the intestines packed away, and the pelvic structures carefully examined. The appendages were normal and the uterus small. There was no infiltration in the fornices. The rectum and uterus were fused together below the peritoneal reflection so that the two structures could only be moved *en masse* from side to side. As it was impossible to remove either viscus apart from the other I proceeded to take rectum and uterus together. For this purpose I began as for a Wertheim's panhysterectomy by dissecting out the ureters; the left ureter was very intimately adherent to the side of the rectum, to the growth and to the vagina. The right duct was not adherent; its course was unaltered. After displacing the ureters and ligating the uterine vessels I divided the parametric tissues as far out as possible, using Wertheim's large parametric forceps for clamping. Being anxious to do as much dissection as possible before excising the bowel, I next carried the vesico-vaginal separation farther down and opened the vagina in front. The uterus was now freed of all its connexions excepting for its attachments to the rectum (by means of the growth) and to the undivided posterior vaginal wall. The rectum was next divided between clamps and the proximal end wrapped up and held aside in the upper angle of the wound. The distal part with the uterus was then removed as follows: The bowel being freed from its cellular attachments was clamped as low down as possible beyond the growth, the clamp including the hitherto undivided posterior vaginal wall. The edges of the vagina were ligated by several interrupted silk sutures. The edges of the rectum were invaginated and then oversewn. The cellular tissues were tied off and the peritoneum of the pelvis closed. I thought it wise to use a vaginal drain, contrary to my invariable custom with a Wertheim operation for carcinoma cervicis. The sigmoid or upper free end of the bowel was brought out through a fresh lateral opening in the left iliac region and the central abdominal wound closed, two drainage-tubes, however, being inserted down to the closed peritoneal level. The fluid collected in the drainage-tubes twenty-four hours after the operation was examined by Dr. Topley, who reported that it yielded a pure growth of *Bacillus coli*.

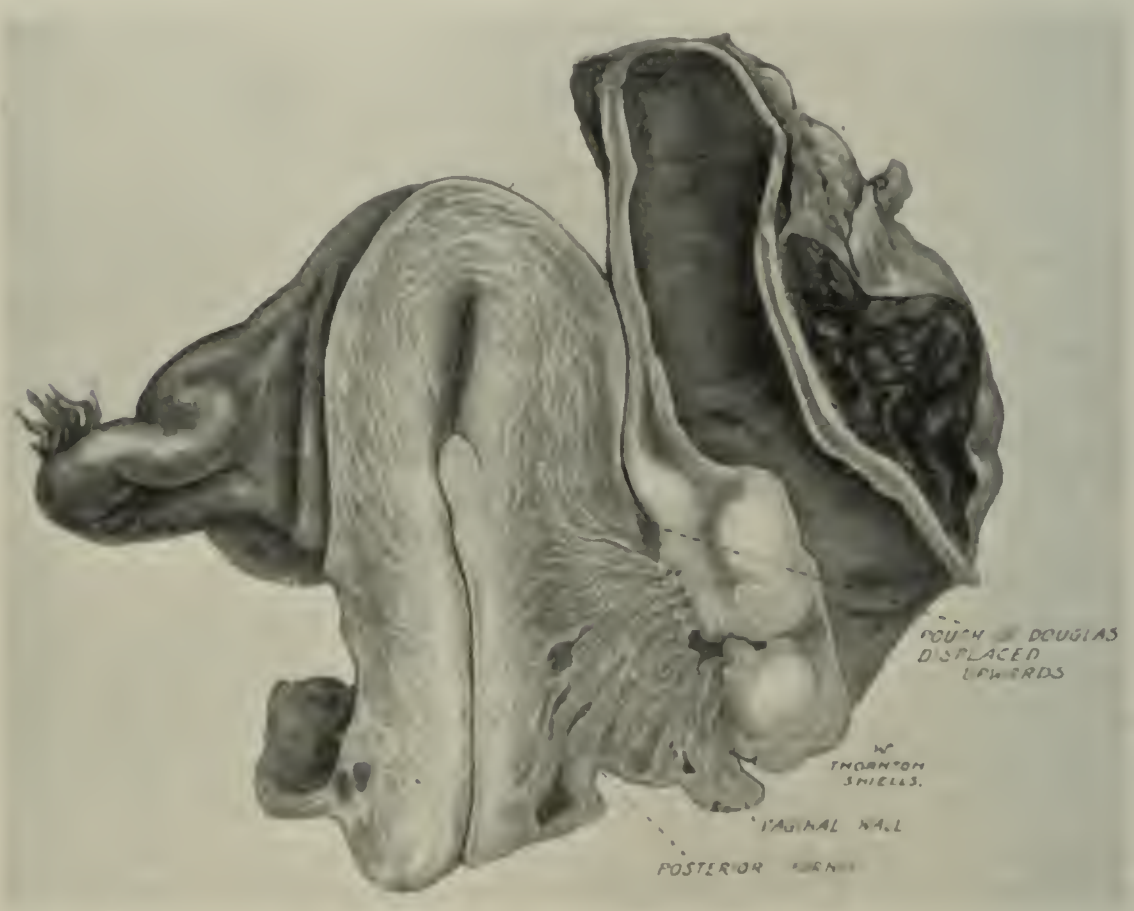


Fig. 1.

Growth in recto-uterine and recto-vaginal septa.

The convalescence was disturbed, but the abdominal wound never broke down and is now healed, and the patient is at present able to be sitting up, though still in hospital.

Microscopically, the growth has the structure of an adenomyoma—i.e., it is composed of dense fibro-muscular tissue in which are sparsely scattered simple gland tubules surrounded by very cellular tissue, similar to that seen around the tubules or follicles of an adenomyoma of the uterus. Histologically, therefore, the growth is comparatively benign, yet if the naked-eye specimen is examined it will be seen that the cervix is definitely invaded by it, as also is the anterior wall of the vagina. There are large hæmorrhagic areas which run down from the centre of the growth to the vaginal mucous membrane. The clinical observation that the mucosa of the bowel was intact was quite correct, the only surface lesion being the puckering of the posterior vaginal wall.

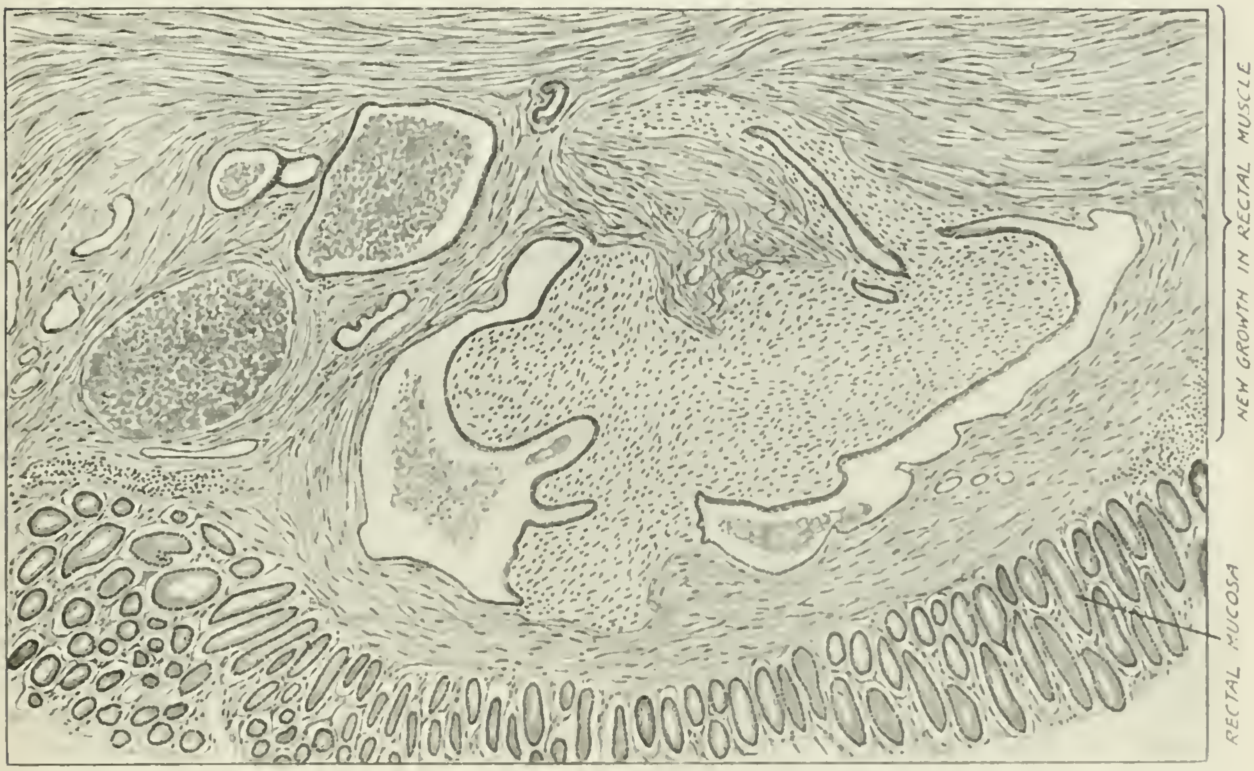


FIG. 2.

Microscopical section of the growth.

I should suggest that this growth arose in some vestigial remains of the Wolffian duct. Such remains generally result in cysts, if they take on any activity at all, and a fact which I have not hitherto published about these cysts is that they have been observed by me to burrow into the posterior wall of the cervix uteri. Here we have a solid glandular growth behaving in exactly the same way as that which I have long known cysts capable of doing—eating its way into the posterior wall of the cervix. So far as my experience goes, these cysts from embryonic remains do not, however, invade the rectal wall; it takes a solid growth to lay hold of the more evasive and comparatively mobile bowel.

As for the correct treatment for solid invading growths of the recto-vaginal septum some doubt may perhaps arise. When I found this apparently malignant growth had all the benign characters of a fibro-adenoma or adenomyoma I naturally asked myself if an operation of such severity as that which I performed was justifiable. On the whole I am inclined to think it was, first for reasons appertaining to the bowel. The lumen of the gut, as the specimen clearly shows, was seriously narrowed, and colotomy would ultimately have become necessary had nothing more radical been done. Secondly, for some reason or other, there was continuous pain with nocturnal exacerbations, which could not have merely been tenesmus. An alternative procedure, in the full knowledge that the growth was comparatively innocent, would have been to cut through the growth, remove the uterus, excise the portion of growth in the anterior wall of the bowel, and sew up the wound in the latter, and so avoid a permanent colotomy. Whilst under the impression that I was dealing with a malignant growth I entertained the idea of doing the combined abdomino-perineal operation which is performed for rectal carcinoma, but the high mortality of this operation inclined me against carrying it out; moreover, I had twice before removed the greater part of the rectum during hysterectomy with complete success,[1] whereas I have had no personal experience with the abdomino-perineal operation. I therefore preferred to err on the safe side, and this leaves me with the unpleasant duty of having to explain to the patient that her colotomy wound is permanent.

[1] Vide *Trans. Obstet. Soc. Lond.* (1906), 1907, xlviii, pp. 84-90.

DISCUSSION.

Dr. MACNAUGHTON-JONES said that he listened with great interest to the particulars of the case described by Dr. Cuthbert Lockyer, as he had himself seen a somewhat similar condition this year. The patient was a married woman, aged 66, a nullipara. She had suffered some time from discharge and some slight bleeding. There had been no pain, but some difficulty with the bladder and bowel. A digital examination had been made, and the condition was declared to be malignant and inoperable. A bimanual examination under an anæsthetic revealed a small cervical polypus, and a fibrotic uterus. The vaginal mucous membrane was healthy, so was that of the rectum. Posteriorly, a hard mass occupied the recto-vaginal septum, and included the entire posterior aspect of the vagina for its upper two-thirds, encroaching laterally for some distance. Also, anteriorly between the bladder and vagina there was another similar growth. Both were very hard to the feel. The uterus was thoroughly curetted out, and some fair-sized pieces of tissue removed for examination. Apart from the polypus the removed tissue showed some infiltration, with small round cells, and some groups of spindle and stellate cells in a stroma of fine fibrous tissue. No definite pronouncement could be made as to whether the condition was of an inflammatory or incipient sarcomatous nature. It was six months since the curetting was done, and quite recently he heard that the patient was in good health, and not suffering to any extent.

Mr. CLIFFORD WHITE said that two cases of growth of the recto-vaginal septum had been admitted into University College Hospital during the last year. It so happened that he had examined both patients under anæsthesia on behalf of the gynæcologist under whom they were admitted, and removed a small portion of the growth for microscopic examination. Both cases were clinically malignant, but the sections of both tumours showed apparently simple adenomatous tissue. There were glands lined by a single layer of epithelium, separated from the connective tissue by a definite basement membrane. No proliferation of the epithelium was present. The connective tissue was fibrous and muscular and contained much lymphoid tissue. The squamous vaginal epithelium was thickened but not epitheliomatous. Their clinical histories were: One patient was a married woman, aged 36, whose only pregnancy had ended in a ten weeks' miscarriage four years before. She was admitted to University College Hospital, under Dr. Herbert Spencer, on November 26, 1912, complaining that for four months she had had pain in the lower abdomen and back and slight menorrhagia. Brownish leucorrhœa had been noticed, but had not been present for two months. She was examined under anæsthesia on November 28, and a hard, nodular, fixed mass, 1½ in. in diameter, in the recto-vaginal septum was found; to the right of this was a slightly larger mass which felt like enlarged glands. The right utero-sacral fold was thickened and nodular up to the pelvic brim. The rectal mucosa was freely movable over the tumour and was not ulcerated. The vaginal mucosa was thickened and fixed to the growth, but was not ulcerated. The growth and the thickened part of the vaginal mucosa were 1 in. from the portio vaginalis, which, with the intervening tissue, was apparently healthy. The uterus and appendages were normal. No operation was attempted. The second patient was a single woman, aged 35, who was admitted to University College Hospital, under Dr. Blacker, on August 15, 1912. She complained that for two years she had had pain in the back (increased during and after menstruation), constipation, and painful defæcation. Menstruation was regular and profuse. No obstetrical history. Under an anæsthetic he found the uterus and appendages healthy. At the top of the vagina, behind, and on the left side, was a firm tumour which had grown into the recto-vaginal septum. The vaginal mucosa was thickened and adherent to it but was not ulcerated: the cervix was healthy. *Per rectum*, the growth was as large as a hen's egg. The rectal mucosa was freely movable over it and was not thickened or ulcerated. The patient was not operated on at the time and was lost sight of till December 30, 1912, when he saw her again. The growth was now 3 in. in diameter and had invaded the rectal mucous membrane, which was thickened, warty, and adherent. There was, however, no ulceration and the growth was not friable. No signs of metastases could be found, otherwise the tumour resembled an ordinary malignant growth. He thought the close relation of the growth to the vaginal mucosa in the early stages of the disease, and the mobility of the rectal mucosa at that time, might be of importance in endeavouring to elucidate the origin of these growths.

The PRESIDENT (Dr. Amand Routh) alluded to the case of a lady, aged 20, where there was a solid mass between the supravaginal cervix and rectum, and in the base of the left broad ligament. The vaginal wall over the growth was fixed and bulging and covered by warty growths. The rectal mucous membrane over the growth was also fixed. It was believed to be sarcomatous by Dr. Cullingworth and Dr. William Duncan, who also saw her. The patient's friends refused to allow a piece to be removed *per vaginam* for microscopical examination, and nothing was done, and the growth continued to grow. Her local doctor became aware that the father of the patient had had syphilis before marriage, and thinking this might be a late evidence of congenital syphilis, ordered large doses of iodide of potassium, and Dr. Routh was able to bear testimony to this doctor's statement that the hard mass had almost completely disappeared in six months' time.

Dr. HERBERT SPENCER thought these cases were rare; he had met with two which appeared clinically to be malignant but showed the structure of adenomyoma on microscopic examination. The first case, which had been alluded to by Mr. Clifford White, occupied the recto-vaginal septum below the posterior lip; the tissues around the rectum were infiltrated up to the pelvic wall and the exudate was nodular. The microscopic examination showed the growth to be "adenomyoma." As the patient was in good health he proposed to watch the case for the present. We knew little of the natural history of this condition, and Mr. White's observation of considerable growth in the course of a few months was important. He did not think such a serious operation as excision of the rectum was indicated for this condition: indeed, it had been shown by Füth and Renisch to be unnecessary. As, however, the growth so closely simulated malignant disease, the importance of excision of a piece of the growth for microscopic examination before removing the rectum was an obvious lesson we should learn. In his second case the tumour occurred in a loop of the sigmoid flexure which was adherent to the uterus, and an interesting point was the presence of a second tumour at the site of another adhesion. The larger tumour was nearly as big as a walnut. In this case he had intended to perform hysterectomy for multiple recurrent myomata, but, finding the growth in the sigmoid and apparently secondary glands (which proved to be movable myomata) beneath the peritoneum, he closed the abdominal wound without removing anything; unfortunately, the patient died of embolism on the thirteenth day. A few records had been published of similar tumours under the name of "adenomyositis uteri et recti." He thought the name was a good one, pointing to its probably inflammatory origin. In his second case the tumours occurred at the site of adhesions, and apparently in Dr. Lockyer's case the rectum was adherent to the back of the uterus, for the peritoneum was reflected from the uterus at the level of the internal os instead of from the vagina below the posterior fornix, and the small tumour shown was not big enough to strip up the peritoneum of the pouch of Douglas to this height. A very interesting point was the origin of the glands. It was, of course, easy to guess that they were of Wolffian or Müllerian origin, but he believed the most recent researches on the subject traced them to the peritoneal endothelium (R. Meyer, Amann, Renisch). But the pathogenesis and natural history of this interesting condition and the part played by inflammation and infection were still very imperfectly known.

Dr. BLACKER thought that there was another source of origin for these curious tumours—namely, that they arose from sequestrated portions of the cervix uteri in the posterior fornix. In the case under his care, narrated by Mr. Clifford White, the vaginal portion of the tumour was close up to the cervix. He had seen, curiously enough in a woman with syphilis, a true adenomatous tumour arising in the posterior fornix, which he had mentioned to the Section on a previous occasion, and very possibly all gradations might be met with from pure adenomata to the peculiar adeno-myoma so well described by Dr. Cuthbert Lockyer.

Mr. MALCOLM said that he had had an opportunity of examining this patient and that he had never before observed conditions exactly like those found. There was a very tender growth in the posterior wall of the cervix uteri or behind the cervix and firmly fixed to it. The abnormal mass was apparently about the size of a walnut and it did not involve the vaginal or the rectal mucous membrane, although it seemed to push against both. When the parts were manipulated some red discharge escaped from the os uteri. It seemed possible that there was a malignant growth of the upper part of the posterior wall of the cervix, extending backwards to the rectal wall, as Dr. Blacker had suggested. As an alternative diagnosis, it seemed possible that a Fallopian tube or an ovary was fixed very low down in the pouch of Douglas, and was subacutely inflamed. But a tube or ovary in this position must have been pressed firmly downwards and the cause of such a downward pressure was not apparent, so that this diagnosis did not seem satisfactory. The speaker recommended that an exploratory operation should take place in the hope that the growth might be removable and because of the obviously unfavourable outlook if no relief was obtainable from surgical treatment. He was sorry that he had not been able to be present at the operation.

Dr. LOCKYER was much gratified by the discussion which this case had evoked, and was particularly interested in Mr. White's account of the three similar cases which were seen at University College Hospital, and he hoped Dr. Spencer would operate on the case under his care. In reply to Dr. Spencer, there were no signs of peritoneal adhesions. Whether there had been any retroperitoneal cellulitis prior to the growth, Dr. Lockyer could not say. One anatomical fact was clear—the pouch of Douglas had been displaced upwards for several inches by the intervention of the growth, between rectum and cervix. Dr. Lockyer noted that Dr. Blacker agreed with his view that the growth sprung from vestigial remains, but that he (Dr. Blacker) favoured the view that these "rests" were probably of Müllerian origin and not Wolffian. That was a point which Dr. Lockyer could not dispute and which he considered difficult to settle.

Obstetrical and Gynæcological Section.

February 6, 1913.

Dr. AMAND ROUTH, President of the Section, in the Chair.

An Early Case of Sarcoma Uteri.

By BECKWITH WHITEHOUSE, M.S.

THE first case that I bring before the Section forms almost the direct converse of the second, and concerns a specimen which to the naked eye appears to be a small fibromyoma undergoing degeneration, and yet under the microscope is a mixed-cell sarcoma.

The specimen was obtained from a woman, aged 50, a 3-para suffering from chronic inflammatory disease of the uterine appendages, admitted to the General Hospital, Birmingham, under the care of Dr. Thomas Wilson. She complained of subacute hypogastric pain of some months' duration, but severe, and necessitating rest in bed for the fourteen days previous to her admission to the hospital. The present acute attack had been precipitated by the administration of an enema. Her menstrual history had been quite regular until twelve months ago. Since then hæmorrhage had occurred every fourteen to twenty-one days. The loss, however, had never been really profuse until shortly before admission to the ward. The patient was not by any means anæmic, and her chief trouble was the abdominal pain.

Examination of the abdomen showed considerable tenderness over the whole of the hypogastrium, and the fundus uteri was just palpable above the pubes, slightly to the right of the middle line. Bimanually, it was found that the uterine enlargement involved the fundus and posterior wall. The organ was also firmly fixed by an irregular inflammatory mass occupying both posterior quadrants of the pelvis, very tender, and evidently in relation with the uterine appendages. Examination of the blood showed a leucocytosis of 14,000.

A diagnosis was made of double chronic salpingo-oöphoritis, complicated by a small fibromyoma uteri. Operation was undertaken primarily for the relief of the inflammatory condition, as the fibroid was apparently not causing marked symptoms. The operation was performed by Dr. Thomas Wilson, who, in accordance with his usual practice, removed the uterus after it had been necessary to sacrifice both appendages. The patient made an uneventful recovery.

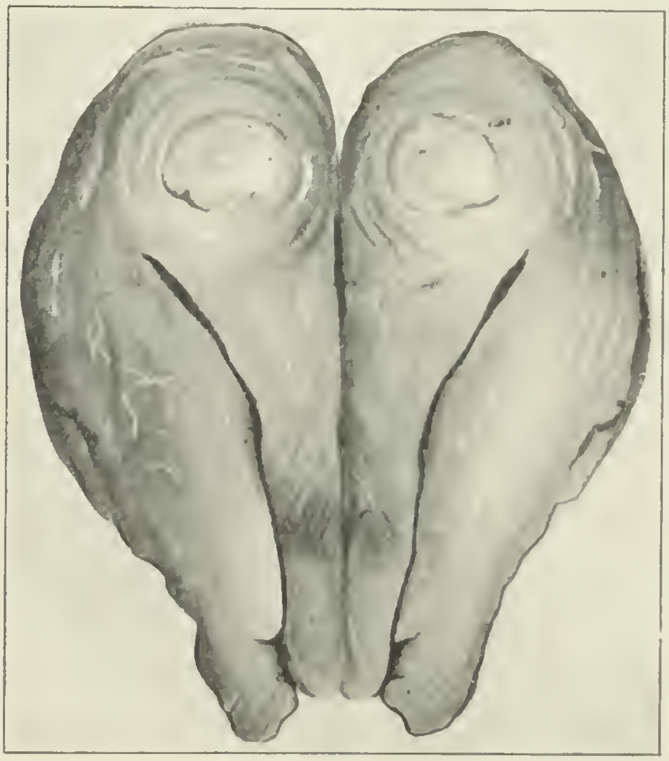
The specimen came under my notice when making the routine pathological examination of the gynæcological material obtained in the hospital, and on referring to the notes I find that I made the following report:—

Pathological Report.—"The specimen consists of the uterus and both appendages removed by the operation of total abdominal hysterectomy, the whole weighing 6 oz. The uterus is slightly enlarged, and the posterior wall near the fundus shows a small prominence. The organ gives the following measurements: 3¾ in. by 2¼ in. by 1¾ in. The peritoneal surface is for the most part smooth. Near the cornua a few adhesions are present, but these are not marked. The colour is pink with some scattered petechial hæmorrhages on the posterior surface. On section, the uterine wall shows considerable hypertrophy, the posterior wall near the fundus measuring 1½ in. in thickness. This increase in size is due partly to the presence of an interstitial, apparently encapsuled neoplasm, measuring ¾ in. in diameter. The growth is solitary and presents somewhat unusual characters. In colour it is yellowish-pink, and the consistence is soft and almost putty-like. The tissue is homogeneous and appears to consist of a fibromyoma which has undergone some form of degeneration, the nature of which to the naked eye is obscure. The change has affected almost the whole neoplasm, and only the periphery shows the concentric arrangement of fibres seen in a normal fibroid. The rest of the uterine wall shows some increase of fibrous tissue, but no other neoplasms are present. The endometrium is smooth and normal. The cervical canal contains a small quantity of blood-stained fluid."

The appendages are not present on the specimen that I bring forward, because they were removed for a thorough microscopical investigation. The Fallopian tubes and ovaries showed the usual changes dependent upon severe and chronic inflammation. No sign of any neoplasm or metastatic deposit was present, however, in either appendage.

The microscopical report upon the uterine tumour states that the neoplasm consists of a small mixed-cell sarcoma. A fibrous stroma is present, but the arrangement of the cells is nowhere of an alveolar type. The tissue is not markedly vascular and the few blood spaces appear to be lined by the tumour cells. The tubes and ovaries show marked inflammatory changes, but there is no evidence of any metastasis.

The interest in this specimen lies in the fact that the nature of the neoplasm was discovered, so to speak, accidentally. The uterus was in no sense sacrificed because of the tumour, and if the latter had occurred apart from the double chronic salpingo-oöphoritis, it is more than probable that its early recognition would never have been made. The symptoms due to the tumour were so slight and the growth itself was so small, that laparotomy for this cause alone was not indicated. At most, a myomectomy would have been attempted.



Perithelioma of the uterus. The drawing represents a sagittal section through the uterus. Occupying the fundus is seen an interstitial, apparently encapsuled growth ; the centre of this neoplasm is soft and homogeneous. The periphery presents a concentric arrangement of fibres forming the capsule to the tumour.

The specimen also raises the old question as to whether we are here dealing with an early fibrosarcoma, or whether the case is one of sarcomatous development in a pre-existing fibromyoma.

My own view is that this and similar growths are fibrosarcomata from the beginning. In the present instance there is no evidence in the patient's history that she had a neoplasm until about a year before she sought advice. Considering the general distribution of the sarcomatous cells throughout the tissue, it is highly probable that the tumour was then already malignant. Nevertheless, the rounded appearance of the growth and the absence of invasion of the surrounding uterine tissue by the sarcomatous cells, with the concentric arrangement of fibres at the periphery, are points that may well be brought forward in favour of the other hypothesis.

Report of the Pathology Committee.—"We have examined this specimen and are of opinion that it is a perithelioma. It contains well-formed vessels surrounded by whorled masses of ovoid cells without intervening stroma and not showing an alveolar arrangement. The growth is not entirely encapsuled, but in places appears to be infiltrating the uterine muscle. We are of opinion that it represents a tumour of a low type of malignancy."

Fibromyoma of the Uterus presenting Unusual Characters.

By BECKWITH WHITEHOUSE, M.S.

The patient from whom this specimen was obtained was a married woman, aged 40, admitted to the General Hospital, Birmingham, on September 11, 1912, with a diagnosis of chorion-epithelioma of the uterus. This diagnosis was made chiefly upon the very interesting history of the patient supplied by her medical adviser, Dr. Boissier, of Banbury. The following is an extract from a letter supplied by Dr. Boissier just previous to her admission to the ward: "The woman is the second wife of a small working farmer. She had been married a year when she thought herself pregnant. In September, 1910, when she was considering herself in the fourth or fifth month, suddenly she had some hæmorrhage, and passed a quantity of hydatidiform mole. I got all away and cleared out the uterus digitally. I sent up the specimen to the Clinical Research Association, and the report is appended. She made a good recovery and went on very well to about the beginning of the present year. I told her particularly to come and see me as soon as anything appeared at all out of the ordinary. I have seen her from time to time since, and all seemed well. Alas! she has not been to me for some time until lately. She has been suffering from menorrhagia evidently, and metrorrhagia since January, 1912. Now I find her uterus bulky and hæmorrhagic, so fear more serious trouble has begun to make headway."

The laboratory report from the Clinical Research Association states that "this material is from a very typical hydatidiform mole. It presents the swollen chorionic villi, with myxomatous degeneration of the stroma, and a small amount of proliferation of the trophoblast. There is no evidence of malignant change."

On her admission to the hospital the patient was well nourished, but looked extremely anæmic. She stated that she had very little abdominal pain, and that her chief trouble was continued and profuse uterine hæmorrhage and general debility. The bleeding began as a menorrhagia, but for the last nine months had been practically continuous. On bimanual examination, the uterus was found to be uniformly enlarged to about the size of a small cocoanut. It was movable, not tender, and the os externum was small and closed. An examination of the blood gave the following result: Red blood cells, 3,033,330; leucocytes, 10,930; hæmoglobin, 50 per cent.

Dr. Thomas Wilson, under whose charge the patient had been admitted, was at this time starting for the Berlin Gynæcological Congress, and he therefore placed her under my care. On September 12 I performed a panhysterectomy and removed both appendages, not deeming it wise to leave the ovaries with the suspicion in my mind of the presence of malignant disease in the corpus uteri. The patient made an uneventful recovery, and is now in excellent health.

The specimen weighs 12 oz. It will be seen that the uterus is enlarged and has been incised through the anterior wall from fundus to os externum, exposing a large sessile polypoid tumour growing from the posterior wall and fundus. This tumour, which occupies the cavity of the uterus, presents rather an atypical appearance. It is ovoid in shape and may be roughly divided into two portions. The whole neoplasm measures 3¼ in. by 2 in. The upper two-thirds is smooth, yellowish-white in colour, and firm in consistence. It is slightly mottled on the surface with blood, and near the broad attached base the tissue is somewhat œdematous. It appears to be partly encapsulated. The lower smaller portion of the growth measures 1½ in. by 1¼ in. and is separated from the upper part by a groove. It is conical in shape, rough and granular on the surface, and dark purple mottled with yellow in colour. The purple colour is due to the extravasation of blood. There is no evidence of endometrium over the lower portion of the tumour, but traces can be seen over the upper larger and smooth part of the same. The endometrium at the fundus uteri surrounding the base of the tumour is thickened and creamy-white in colour. The cervix is normal in appearance. The right ovary contains a large corpus luteum but is otherwise normal. The left ovary also contains lutein tissue and is healthy. Both Fallopian tubes are normal.

The naked-eye appearance of the tumour suggested to me that the condition was a fibromyoma undergoing sarcomatous change. There was, after all, no microscopical evidence of chorion-epithelioma in spite of the suggestive history. Microscopical examination, however, shows that the neoplasm is quite benign, and consists of a fibromyoma into which hæmorrhage has occurred, and in which many of the vessels are thrombosed. The upper half of the tumour shows the structure of a typical slightly œdematous fibromyoma. The lower polypoid portion exhibits large thrombosed vessels and diffuse hæmorrhage into the fibrous stroma. A section taken near the attached base of the growth shows considerable hypertrophy of the stroma cells of the endometrium, to the exclusion of the glandular elements. It is at first a little difficult to explain the presence of this somewhat embryonic tissue, but on tracing the same upwards, its connexion with the uterine endometrium is established by the occurrence in it of a few typical uterine glands.

I have brought this specimen before the Section because of the interesting history previous to operation, and also because the appearance of the tumour was such as to negative any expression of opinion as to its nature until a thorough microscopical examination of all parts of the growth had been conducted.

Report of the Pathology Committee.—"The Committee is of opinion that this tumour is a fibromyoma of which the lowest part exhibits thrombosis and extravasation of blood. This suggests that the tumour in process of extrusion has become partly strangulated."

The PRESIDENT (Dr. Amand Routh) alluded to a similar specimen which he had exhibited[1] at the Obstetrical Society in 1907. It consisted of the fibromyomatous uterus removed from a married multipara, aged 52, who had been menstruating regularly. For three months, however, she had had menorrhagia, with paroxysmal pain beginning daily at 6 p.m. The specimen consisted of the uterus containing an old fibroid in its wall with small nodules of a different nature in its stroma. These nodules proved to be giant-celled sarcomata invading the co-existing fibromyoma. The patient was now, after six years, in perfect health.

---

[1] *Trans. Obstet. Soc. Lond.*, 1907, xlix, p. 1.

Diffuse Ovarian Fibroma with Central Cyst.

By Arthur E. Giles, M.D.

The patient, a widow, aged 63, consulted me in October of last year; she had had one child, and menstruation had ceased at the age of 46; there had been no hæmorrhage since. She complained that for four or five years she had had "falling of the womb" and difficulty with the bowels. She constantly required to take medicine and suffered from flatulence. For the last few months there had been difficulty in passing water on getting up in the morning. On examination, the vaginal walls bulged through the vulva, a large hard tumour was found impacted in the pelvis; it evidently exerted considerable pressure on the bladder and rectum, and pressed down the vagina; the cervix was drawn high up behind the pubes. The diagnosis was subperitoneal fibroid. At the operation, which took place towards the end of November, the tumour was found to be ovarian; the uterus was small and atrophic, and the removal of the tumour proved a simple matter. The specimen was sent to Dr. Eastes's laboratory, and the following report was received:—

"The specimen was a large, solid, ovarian tumour, measuring 7¼ in. by 4½ in. by 3¾ in., and weighing 2 lb. 12 oz. The surface was smooth. On section the cut surface was white and almost homogeneous. Centrally was a large cyst (2½ in. by 2 in.) with smooth walls and containing a yellowish, clear fluid. A few other small cysts were present. The tissue was hard in consistency but slightly œdematous. Microscopically it was composed of fairly well nucleated fibrous tissue, and the appearances are practically the same throughout. The central cyst has a definite cyst wall composed of fibrous tissue, poor in nuclei and lined by a flattened and degenerate epithelium. The specimen is a diffuse ovarian fibroma, containing a follicular cyst in the centre. It is not malignant."

The occurrence of cystic degeneration in uterine fibroids is a fairly familiar phenomenon, but the presence of a cyst cavity in the substance of an ovarian fibroma is new to me, although in one other case I have met with some central softening. Solid innocent ovarian tumours are not very common, and I have thought that it might be of interest to give, in the appended note, an analysis of the different kinds of ovarian neoplasm that I have met with among my abdominal operations.

A Note on the Relative Frequency of Ovarian Tumours and Cysts based on the Analysis of 400 Ovariotomies.

By ARTHUR E. GILES, M.D.

I HAVE been asked the relative frequency of the ovarian new growths that I have come across in my operation cases, and therefore take the opportunity, while recording a case of ovarian fibroma, of adding an analytical note of my ovariotomies; in some of the cases the ovarian tumour was incidental to other conditions in the pelvis, such as uterine fibroids.

ANALYSIS OF OVARIAN NEOPLASMS.

(A) *Non-malignant.*	Single	Double	Total
Multilocular ovarian cyst	213	27	240
,, complicating pregnancy	8	—	8
,, on one side, dermoid on the other	—	1	1
,, ,, parovarian ,,	—	1	1
,, ,, blood cyst ,,	—	1	1
Cystic adenoma	12	4	16
Parovarian cyst	24	2	26
Dermoid cyst	30	5	35
,, ,, complicating pregnancy	3	—	3
Papilloma	6	6	12
,, complicating pregnancy	1	—	1
Fibroma	4	—	4
Fibro adenoma	4	—	4
Lutein haematoma and blood cyst	16	—	16
(B) *Malignant.*			
Papilloma	—	5	5
Adeno-carcinoma	3	5	8
,, on one side, multilocular cyst on the other	—	1	1
Carcinoma	5	11	16
Sarcoma	1	1	2
Total of cases	330	70	400

Of the cases complicating pregnancy, two were operated upon in the puerperium, and the third, a multilocular cyst weighing 31 lb., was removed during labour; of the dermoid cysts five were multilocular.

The percentage of the principal growths is as follows:—

	Cases	Per cent.
Multilocular cyst	248	62·0
Parovarian cyst	27	6·75
Dermoid cyst	39	9·75
Papillomatous cyst	13	3·25
Cystic adenoma	16	4·0
Hæmatoma and blood cyst	17	4·25
Fibroma and fibro-adenoma	8	2·0
Malignant tumours	32	8·0
	400	100

Of 368 cases of benign growths 47 were bilateral (12·6 per cent.). Of 32 cases of malignant growths 23 were bilateral (71·9 per cent.).

Tumour of Doubtful Nature removed from the Groin.

By Mrs. SCHARLIEB, M.S.

M. R., AGED 38. Married at the age of 30; two children, aged 7 and 5. First seen March, 1910, when she had a severe abrasion of the cervix, the vaginal portion of which was full of cysts. In November, 1910, she was dilated and curetted, and the histological report was: "The cervix shows much gland tissue, the glands are dilated, but their epithelium is innocent. The mucosa of the cavum uteri shows interstitial fibrosis and some areas of round-celled infiltration." In spite of this treatment the erosion did not heal until May, 1911.

In December, 1912, M. R. complained that she had noticed a small lump in the right groin in July, and that her right leg ached when she cycled. Examination showed a small movable lump (? gland) in the right groin.

January 4, 1913: Under anæsthesia the gland was found to be much softened, and a chain of glands was felt along Poupart's ligament. They were removed in one mass commencing from without inwards, the largest innermost mass was adherent by its deep surface to a small hernial sac containing omentum. Radical cure was performed. Patient made a good and quick recovery. The glands were sent to a laboratory and the following report was received:—

" One of these lymphatic glands is fibrotic and contains a few well-marked and definite gland lumina of regular construction and lined by columnar epithelium. The presence of an adeno-carcinoma somewhere within the abdominal cavity may be inferred with some confidence."

I then obtained a further opinion, which was to the effect that the specimen was a lymphatic gland, but that its nature was innocent. I appealed to yet another pathologist and received the following opinion :—

"Large areas of fibrous tissue and some fat. Numerous collections of small, round inflammatory cells, and in places old blood pigment. Many well-formed blood-vessels. There is a collection of large glands lined by columnar cells in a single layer and surrounded by fibrous tissue; immediately surrounding some of the glands are many spindle cells. Some of the circles of columnar cells are surrounded by a thick tube of fibrous tissues, suggesting a duct. There is nothing to suggest the tissue of a lymphatic gland. In another part of the section are several large cysts with loose connective tissue walls containing many inflammatory cells, but one of them is partly lined by a flattened layer of epithelial cells (distended gland or duct). There is nothing in the section to indicate malignant disease. The specimen is an example of a congenital cystic structure, occasionally met with in the inguinal region. They are usually attached to the round ligament and give rise to the diagnosis of inguinal hernia. The origin of the gland-like tissue is probably from the Wolffian body or ducts. In this specimen the appearances are very like that of the ovary."

Report of the Pathology Committee. — "We have examined the sections submitted by Mrs. Scharlieb and are of opinion that the tumour consists of tubules representing Wolffian relics surrounded by dense fibrous tissue and smooth muscle strands. There are endothelial-lined spaces on the periphery of the tumour, probably peritoneal in origin, and remnants of the canal of Nuck. There is no evidence of lymphoid tissue in the section, and we are of opinion that it is a benign formation."

Red Degeneration of Uterine Fibromyomata.

By J. LORRAIN SMITH, M.D., and W. FLETCHER SHAW, M.D.

WE published in April, 1909, a paper giving the results of our examination of five specimens of red degeneration in fibromyomata of the uterus. We found all these five specimens had thrombosis of the blood-vessels with a large quantity of fat crystals collected around them. We considered the thrombosis to be the primary pathological change, and the fat to be a product of metabolism which ordinarily would be carried away in the blood- or lymph-stream, but now was collected in the tissues owing to the interference with the circulation by thrombosis. The red colour we thought to be due to the staining of the tissue by hæmoglobin. One of the specimens showed a great increase of small, thin-walled blood-vessels which would increase the red colour.

Since that date Leith Murray has published a paper [3] in which he has brought forward evidence to prove the hæmolytic action of the fat. He dissolved the fat out of these red fibromyomata by means of ether, and tested the hæmolytic action of his extract on red blood corpuscles suspended in normal saline. He found this action was prevented by the presence of blood serum, so that the hæmolytic action would not occur until the fat was present in sufficient quantity to neutralize the serum. The first colour he obtained was red; with a greater quantity of fat the saline became brown; with a still greater quantity a black-brown deposit was thrown down, and the fluid became clear.

Since writing our previous paper we have had the opportunity of examining nineteen other specimens of fibromyomata of the uterus, which exhibited a markedly red surface when sliced across. We now propose to give an account of our whole series of twenty-four specimens. Though all these twenty-four specimens had the common characteristic of red colour, they differed in other ways; in some there was free blood in the tissues, some lost their colour in the Kaiserling solution, some had definite clinical symptoms, while others had none. It seems improbable that the red colour of all these tumours is due to the same pathological change, and it is necessary, therefore, to note the pathological changes occurring in each specimen, and classify them accordingly. The chief pathological change we find to be thrombosis of the blood-vessels. If we divide our twenty-four specimens into two groups, the one with and the other without thrombosed vessels, we find that those with clinical symptoms, with deep red coloration and with no free blood on the cut surface, are those in which we find thrombosis, while those without clinical symptoms, with free blood in the tissues and with a tendency to lose the colour in the preserving fluid, are those without thrombosis.

GROUP WITH THROMBOSED VESSELS.

Fifteen of our specimens fall into this group. In a few specimens all the vessels appear to be filled with thrombus. In others, and these are in the majority, only a portion of the vessels contain it; again in some the lumen of the vessel is filled with thrombus, in others the thrombus is collected only around the sides of the vessel wall. In all the specimens of this group but one the colour was deep red, and showed no tendency to fade in the Kaiserling solution, in which all our specimens are preserved, nor was there any free blood on the surface when the tumour was bisected immediately after operation. In the majority the coloration extended all through the specimen, though in a few it only occurred in one part and gradually faded away, leaving the other part of the tumour the colour of a normal fibromyomatous tumour. In one specimen, No. 3, the red colour occurred in patches around groups of thrombosed vessels; this specimen we shall refer to later in detail. The one exception was of a dirty grey colour, and with the naked eye could be seen to be riddled with vessels filled with thrombus. Clinically this patient had acute abdominal pain prior to operation, with rapid increase in size of the tumour. This is apparently one of the cases in which the fat has been in such large quantity that the laking of the blood has given place to a black deposit as described by Leith Murray. All the patients but one in this group had clinical symptoms in addition to the mere presence of the tumour or excessive hæmorrhage prior to operation. Abdominal pain with tender tumour occurred in seven; rapid enlargement of the tumour in three; high temperature in three; patient very ill and weak in four; rapid pulse in two. Rapid enlargement of the tumour with abdominal pain and tenderness are the symptoms to be expected from a thrombosed tumour. No. 4 had a remarkably acute history. The first symptom was acute abdominal pain commencing in the middle of the night, so severe that her doctor, who was immediately summoned, thought she was suffering from ruptured tubal gestation. A gynaecologist was called in, who diagnosed a soft fibroid, which, in view of the acute symptoms, he thought was undergoing red degeneration. A few days later an abdominal hysterectomy was performed, when a single interstitial, soft, very red fibromyoma was found in the uterus, and the blood-vessels were filled with thrombus.

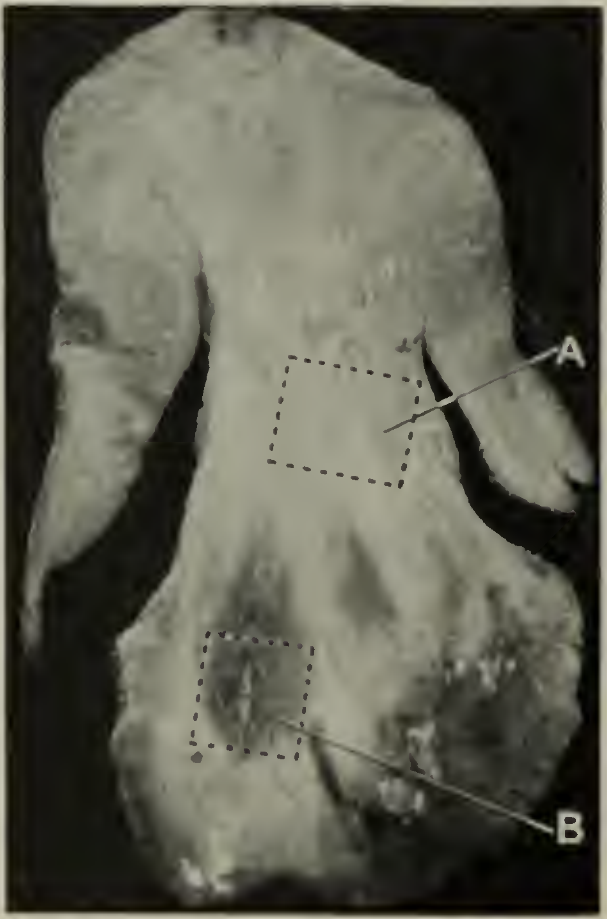
A thrombosed tumour will very soon commence to disintegrate; when this occurs, one would expect the patient to show symptoms due to the absorption of the products of tissue disintegration quite apart from micro-organismal infection of the tumour. This, we find, did occur in six of these patients.

A thrombosed, degenerating tumour makes an ideal medium for the growth of micro-organisms, which readily reach it from the neighbouring intestines, from the genital canal, or from the blood-stream. Patients infected in this way would suffer from a high temperature, rapid pulse, and general symptoms of septicæmia. In the first series we published [5] two tumours were found to be invaded with micro-organisms, one with *staphylococci*, the other with *diplococci*. In this additional series of nineteen specimens, two had a high temperature prior to operation, and in one of these we found *staphylococci*. All our specimens were immersed in Kaiserling solution before being opened, so it was impossible to grow the organisms, and we had to rely upon finding them with the microscope. In the whole series, three patients had a high temperature previous to operation, and we found organisms in two of the tumours; we have no doubt they also occurred in the third, though we could not find them by this method. In the third case in which we found micro-organisms the patient had no rise of temperature, but was extremely ill, and had a pulse-rate of 120 per minute. It is interesting to note that three of these four cases were operated upon in the puerperium, one two days, one two weeks, and one three months after delivery; the infection in these cases being derived probably from the genital canal. In all four cases the symptoms ceased immediately after operation. Since our first communication Bland-Sutton [1] has published one case of red degeneration infected with *Staphylococcus pyogenes aureus*.

Leith Murray [3] agrees with us that the acute symptoms and the rapid enlargement of the tumour are due to the thrombosis.

Fibromyomata are always described as being poor in blood-vessels, but all these specimens contained large numbers of small, thin-walled vessels, though not always so numerous as in the other group to be described.

All these tumours contain fat, and so support Leith Murray's contention that the colour is due to the hæmolytic action of the lipoids. This we agree with, in fact in our earlier paper we drew attention to the large amount of fat collected between the degenerating muscle-bundles. We do not, however, agree with his statement that "the disorganization resulting from hæmolysis of the corpuscles induces the deposit of fibrin in a vessel wall already partly disintegrated and ready to precipitate such a deposit." We consider that the thrombosis is the primary change, and that the fat is collected in the tissues owing to the interference with the circulation, the laking of the blood occurring when the amount of fat collected in the tissues is sufficiently large to neutralize the anti-hæmolytic action of the blood serum. This is proved by specimen No. 3. This specimen consists of a submucous fibromyoma the size of a pear. A section through it (*see* figure) shows several dark red areas, while the remainder of the tissue retains the appearance of normal fibro-



Fibromyoma showing red degeneration: **A**, uncoloured portion; **B**, coloured portion.

myomatous tissue. Microscopical sections taken from one of these dark areas (B) show the majority of the vessels to be filled with thrombus, while all through the tissue can be seen large numbers of fat crystals. Sections taken from an uncoloured portion of the tumour (A) show several of the larger vessels with a small amount of fibrin around their walls, while the majority of them are quite free. Hardly any fat can be found in this tissue. We thus see that at B extensive thrombosis has occurred; owing to this interference in the circulation much fat has accumulated in the tissues, and hæmolysis occurred. In A, the uncoloured portion of the tumour, thrombosis is commencing in the larger vessels, but the process is so early that the circulation has not been interfered with, and the fat can still be carried away, so no hæmolysis has occurred.

In our previous paper we noted the occurrence of degeneration in all our specimens, just as Fairbairn [2] and Taylor [5] had done. All these specimens showed some degeneration, a few to a slight, others to a very marked degree, but it is very exceptional to find a uterine fibromyoma which is not undergoing slight degeneration.

The question of pregnancy as a causative factor of this condition is interesting. Of the five cases we previously published, one was pregnant and three had recently been confined. Of the ten new thrombotic specimens, none were pregnant, and only two had recently been confined. So of the total fifteen specimens only six had any relation to pregnancy.

GROUP WITH NO THROMBOSED VESSELS.

These are generally of a bright red colour, often with free blood on the cut surface. In every specimen there are numbers of thin-walled blood-vessels, generally very small and only visible under the microscope; these are generally completely filled with red blood corpuscles, the whole tumour being in a state of congestion. In the majority of the tumours these vessels are so numerous as to warrant the title of "angiomatous degeneration." These numerous small vessels, filled with blood corpuscles, in some specimens alone, in others augmented by free blood in the tissues, are sufficient to account for the bright red colour of the specimen.

Many of these specimens exhibited fresh blood on a freshly cut surface, and the majority of the specimens lost their colour in the preservative fluid, so demonstrating that the colour is due to the presence of the blood and not to a hæmoglobin staining of the tissues. Only one specimen showed the presence of much fat, and in this one the colour was a deep red, as in the thrombosed group, and this was not lost in the preserving fluid. Probably in this one fatty degeneration had taken place so rapidly that the vessels were not able to carry it all away and so allowed of the hæmolytic action. This is a specimen in which we should have expected thrombosis of the vessels if the thrombosis is due to the presence of fat. In one of the others we found a little fat, but this specimen was of a bright red colour, most of which was lost in the preservative. None of the patients from whom this group of tumours was removed showed any clinical symptoms beyond the hæmorrhage and a feeling of weight due to the presence of the tumour. Three of the nine specimens in this group were associated with pregnancy, two patients being pregnant at the time of operation and one three months *post-partum*.

CONCLUSIONS.

(1) Uterine fibromyomata of a red colour are divided pathologically into two classes, thrombotic and angiomatous.

(2) The thrombotic are of a deep red colour, which is not lost in Kaiserling solution, nor is there any free blood on a cut surface nor in the tissues.

(3) The thrombotic exhibit various degrees of thrombosis: the early ones showing only a collection of thin threads around the walls of a few vessels, while the late ones have all the vessels plugged with them.

(4) The thrombotic have clinical symptoms of abdominal pain, tender tumour, rapid enlargement of the tumour, general ill-health, rise of temperature and pulse-rate; these symptoms may occur singly or in combination.

(5) All the thrombotic fibromyomata contain a large quantity of fat due to the retardation of the circulation by the thrombosis of the blood-vessels.

(6) The red colour of the tumours is due to the hæmoglobin staining associated with the action of the accumulated fat.

(7) The majority of the specimens in this group contain a large number of thin-walled vessels: in this respect the two groups are similar.

(8) The angiomatous group contains large numbers of thin-walled vessels.

(9) These vessels are filled with red blood corpuscles: in some specimens the congestion is further advanced and free blood is found in the tissues (hæmorrhage).

(10) The colour of these specimens is bright red and tends to fade in the preservative fluid. It is due entirely to the large amount of blood in the tissues, and not to hæmolysis and hæmoglobin staining.

(11) The patients do not have any clinical symptoms other than bleeding and a feeling of weight due to the presence of the tumour.

FIFTEEN SPECIMENS WITH THROMBOSED VESSELS.

No.	Hospital No.	Pregnancy	Symptoms	Thrombus	Fat	Colour	Vessels
1	23/10	Primipara, 3 months	No symptoms	Much thrombus	Fat	Deep red	Many small vessels
2	165/10	—	Abdominal pain; tumour tender	Thrombus	Fat	Deep red	Many fair-sized vessels
3	419/10	—	Abdominal pain; tumour tender	Thrombus in red areas; a little thrombus in white areas	Fat in red areas	Deep red in parts	
4	1114/12	—	Abdominal pain; tumour tender	Thrombus	Fat	Deep red	Many vessels
5	1195/12	—	Stabbing pain 2 months ago	Early thrombus	Fat	Deep red	Many vessels
6	215/10	—	Severe pain; rapid enlargement	Thrombus	Fat	Dirty colour	Many vessels
7	287/10	—	Severe pain in back for 3 days	Thrombus in parts	Fat	Red in parts where thrombus occurs	Many vessels
8	241/9	—	Pain for 4 weeks	Thrombus	Fat	Red	
9	259/11	Primipara, 2 weeks	Temperature 100·6° F.	Early thrombus	Much fat	Almost black	Many large vessels
10	1209/12	—	Temperature 102° F.	Early thrombus; staphylococci	Fat	Deep red	Many small vessels filled with blood
11	14/9	Primipara, 3 months	Very ill and weak; rapid enlargement of tumour	Thrombus	Fat	Deep red	Many vessels
12	194/7	Primipara, 3 months	Very ill; pulse 120	Thrombus; staphylococci	Fat	Deep red	
13	198/7	Pregnant	Severe pain; rapid enlargement; very ill	Thrombus	Fat	Deep red	
14	119/8	—	Rapid enlargement of tumour	Thrombus	Fat	Deep red	
15	—	Primipara, 2 days	Temperature 103° F.; pulse 128	Thrombus; diplococci	Fat	Deep red	

NINE SPECIMENS WITHOUT THROMBUS.

No.	Hospital No.	Pregnancy	Symptoms	Thrombus	Fat	Colour	Vessels	Blood in tissues
16	236/11	—	No symptoms	No thrombus	No fat	Bright red	Very many vessels	
17	1123/11	Primipara, 3 months	No symptoms	No thrombus	No fat	Loses colour	Many vessels	Free blood in tissues
18	1008/11	—	No symptoms	No thrombus	No fat	—	Many vessels	Free blood
19	1051/11	—	No symptoms	No thrombus	Much fat	Deep red	Many vessels	
20	1208/12	—	Increase in size for 6 months	No thrombus	No fat	Bright red	Many vessels	Free blood
21	236/10	Pregnant	Aching pain for 4 days	No thrombus	No fat	Loses colour	Many vessels	Free blood
22	6/10	—	No symptoms	No thrombus	A little fat	Loses colour	Many vessels	
23	522/10	Pregnant, 3 months	No symptoms	No thrombus	No fat	Loses colour	Many vessels	
24	151/8	—	No symptoms	No thrombus	No fat	Bright red	Very many vessels	Free blood

REFERENCES.

[1] BLAND-SUTTON. *Brit. Med. Journ.*, 1909, i, p. 1471; *Proc. Roy. Soc. Med.*, 1909, ii (Obst. Sect.), p. 300.

[2] FAIRBAIRN. "A Contribution to the Study of one of the Varieties of Necrotic Change—the so-called Necrobiosis—in Fibromyomata of the Uterus," *Journ. Obstet. and Gyn. Brit. Emp.*, 1903, iv, pp. 119-34.

[3] MURRAY, LEITH. "The Hæmolytic Lipoids of Degenerating Fibroids, with Special Reference to Red Degeneration," *Journ. Obstet. and Gyn. Brit. Emp.*, 1910, xvii, p. 534.

[4] SMITH, LORRAIN, and SHAW. "The Pathology of the Red Degeneration of Uterine Myomata," *Journ. Obstet. and Gyn. Brit. Emp.*, 1909, xv, pp. 225-35.

[5] TAYLOR. "Necrobiotic Fibroids and Pregnancy," *Practitioner*, 1906, lxxvi, pp. 804-14.

(For other references see Leith Murray's, Fairbairn's, and our previous papers.)

DISCUSSION.

The PRESIDENT (Dr. Amand Routh) said that the researches of Professor Lorrain Smith and Dr. Fletcher Shaw on the pathology of red degeneration had been carried on for some years, and to these observers and to Dr. Leith Murray, who had demonstrated the hæmolytic action of the fat observed by the two former, was due almost all the precise knowledge we now possessed. The paper read to-night showed for the first time which variety of red degeneration caused clinical symptoms and which did not. Thus the group of degenerating fibroids which exhibited thrombosed vessels caused general and local disturbance, pyrexia, malaise, perhaps septicæmia, pressure symptoms and tenderness; whereas those where there was no thrombosis caused little or no discomfort. The tendency of a thrombosed tumour to disintegrate was what one would expect and toxæmia would necessarily follow. That such fibroids would be extremely liable to become infected was also obvious. These facts the authors had clearly demonstrated, and the clinical evidences of disintegration and infection had been pointed out. The fibroids with no thrombosed vessels, owing their red colour to the free blood seen on the cut surface, and not to hæmoglobin staining as in the first group of tumours, were shown to be really congested tumours, with no special clinical symptoms except hæmorrhage and pressure symptoms. The need for prompt removal of tumours in the first group was manifest, whilst those of the second group might be treated, temporarily at all events, by less radical methods, till a convenient time for operation could be found. Such treatment had, in the past, followed on the clinical symptoms as described by the authors, but the significance of those symptoms from the pathological point of view would now be clearly understood, and it would be easier to prophesy with accuracy which variety of degeneration would be found on section of the tumour.

Dr. ARNOLD W. W. LEA stated that the case upon which he had operated, and which Dr. Shaw had demonstrated before the Section, was a patient with a large fibromyomatous uterus. The clinical history, shortly, was that the patient was aged 35, had had two children, and two miscarriages. From December, 1909, she had almost continuous uterine bleeding and a very offensive discharge. When she came under his care she was extremely anæmic from the constant loss of blood. She was kept under observation in hospital for some days. A large fibromyomatous tumour occupied the lower part of the abdomen. This was very tender to the touch and was gradually increasing in size. An operation was performed on September 27, 1910, at St. Mary's Hospital, abdominal panhysterectomy being carried out. The peritoneum was brought together and gauze introduced into the vagina from the abdomen. The mass, on section, was extremely offensive, and consisted of a uterus, the walls of which were the seat of a diffuse myoma and a very large fibromyomatous growth, which took its origin at the fundus and was extruding through the cervix. Unfortunately, in the patient's reduced condition, and as a result of the toxaemia from which she was suffering, peritonitis gradually developed, and she died on October 1, four days after the operation.

Dr. FAIRBAIRN congratulated Professor Lorrain Smith and Dr. Fletcher Shaw on their interesting paper, and said that his chief criticism was in regard to a point on which the authors themselves were not able to make a definite statement, and that was whether the thrombosis was a primary or a secondary effect. Until that was decided it did not seem to him that their paper helped to explain the causation of this degeneration. The thrombosis by itself would not cause the general staining of the tissues and in the two types which they described it was present in those with acute symptoms. Now this marked thrombosis was just what would be expected in any acute necrotic change, and was, therefore, merely another way of saying that a rapid and acute process had taken place and did not carry us any further towards an explanation of this variety of degeneration. When the process was gradual and did not cause acute symptoms thrombosis was not present. When, as the authors described, the white portions of the periphery of the tumour showed little thrombosis, whilst the redder portions in the centre had many thrombosed vessels, the necrotic change was delayed by the peripheral blood supply, so that it was more gradual there than in the centre, and, therefore, accompanied by less thrombosis. Another point was the occurrence of infection by pathogenic organisms, which the authors considered to be fairly frequent. He would like to have had clearer evidence of this, as it was difficult to understand how such a condition could arise without our seeing much more often the later stages of these infected tumours. It might be said that they were all removed by operation before the tumours broke down as the result of the infection, but surely some cases must escape operation to a stage sufficiently late to show some effect of their infection, if it were as frequent as the authors suggest. He would like to ask Dr. Fletcher Shaw what he thought to be the late stage of these infected necrotic tumours.

Dr. R. H. PARAMORE said he was interested in the cause of the red degeneration of fibroids. The material on which Dr. Lorrain Smith's and Dr. Shaw's paper was founded was obtained from non-pregnant and pregnant women, but it was the occurrence of this degeneration in fibroids in the latter cases which interested Dr. Paramore. Dr. Paramore would like to point out the marked resemblance of the lesion in these fibroids to that found in the liver and kidneys of pregnant women suffering from the ordinary toxaemia of pregnancy. The lesion in the degenerate fibroids consisted of a necrosis of tissue cells and an exudation of blood; and the same was found in the liver and kidneys in toxaemic cases of pregnancy. The two lesions were exactly comparable. And the two types of case were comparable clinically; but the symptoms were of different order, for the tissues affected were vastly different in their relation to the body. The fibroid was an inert new growth, but when it became the seat of red degeneration it gave rise to symptoms which

Dr. Shaw had mentioned. But the liver and kidneys were vital organs; it was not to be expected but that extensive necrosis of their cells would be associated with anything but a profound toxæmia. Thus, they might well regard the red degeneration of fibroids occurring in pregnant women as a species of the toxæmia of pregnancy—arising from the same cause and resulting in symptoms dissimilar only in their intensity because of the different type of tissue involved. Four years ago, in a remark,[1] Dr. Paramore had put forward the view that the toxæmia of pregnancy was mechanically caused. He believed it to be due to a persistent increase of intra-abdominal pressure incident to pregnancy. He was well aware that at the present time it was perhaps universally believed that the pressure within the abdomen was not increased in pregnancy; but that was a mistaken belief. The three writers with whose papers he was familiar, the only three as far as he knew who had made observations of the pressure in pregnancy, although they had found higher values in pregnancy than in the non-pregnant state, persisted in the belief that the intra-abdominal pressure was not increased in pregnancy.[2] Dr. Paramore had made a good many observations, and from these and other reasons he had no doubt the pressure was increased in pregnancy. He would like to ask Dr. Shaw whether in his opinion the lesions found in the red degeneration of fibroids might not be explained as a result of obstruction of the circulation through the fibroid caused by pressure. The slides exhibited under the microscope showed in a beautiful way a marked dilatation of the capillaries which he thought indicated such a cause. That this was so seemed to Dr. Paramore the most reasonable as well as the simplest explanation. Dr. Paramore thought the occurrence of the red degeneration of fibroids occurring in the non-pregnant should not be taken as evidence off-hand that the similar occurrence in pregnancy was not the result of a pressure effect occurring in pregnancy; but rather that the cases occurring in pregnancy threw light upon the pathogenesis of the condition in the non-pregnant. It was well known that great variations of the intra-abdominal pressure occurred in the non-pregnant, but, besides, other pressure conditions might explain this phenomenon; but he was not prepared to discuss the cause in these cases, as he had not yet observed one clinically and so was unable to formulate an opinion.

Dr. EDEN said that there were many points of great interest in the paper and he thought the authors had done a good deal to clear up the question of red degeneration. He gathered from the paper that the authors regarded thrombosis as the primary change in the thrombotic group, the blood staining, the necrosis, and the occasional invasion of micro-organisms being all secondary changes. If this were so he would like to ask them if they could suggest any explanation of the thrombosis? And could they tell us whether changes similar to red degeneration occurred in benign connective tissue tumours arising in other organs? If this form of degeneration was peculiar to uterine fibroids, it was very difficult to resist the conclusion that some form of infection from the endometrium must be the cause of it.

---

[1] *Proc. Roy. Soc. Med.*, 1909, ii (Obst. and Gyn. Sect.), p. 222.

[2] The three writers referred to are: Schatz, *Arch. f. Gyn.*, 1872, iii; Moritz, *Zeitschr. f. Biol.*, 1895, p. 313; Hörmann, *Arch. f. Gyn.*, 1905, lxxv, p. 527-619.

Dr. ARTHUR GILES expressed his appreciation of the valuable paper that they had listened to. The existence of pregnancy in six cases out of twenty-one appeared to him to be really a rather striking proportion when it was considered how rarely fibroids and pregnancy were associated. It did not follow that one must assume that pregnancy was the cause of degeneration, it was sufficient to suppose that the cause of red degeneration was present when there was pregnancy; as to that cause, he was more interested in, than convinced by, Dr. Paramore's suggestion that the cause might be toxic, and found a parallel in the toxic conditions present in eclampsia. If this were the correct explanation, one would expect to find evidence of degeneration in other places besides the fibroid; but as far as he knew this was not the case. Dr. Paramore made another interesting suggestion—namely, that the thrombosis might be the result of increased pressure. Dr. Paramore specified that the increased pressure was intra-abdominal; there was another kind of pressure that would have an even greater effect namely, the tension on the capsule of the tumour produced by the increase of the growth, and if this explanation were invoked it would account satisfactorily for the occurrence of red degeneration in connexion with pregnancy, because the rapidly growing uterus would furnish this factor. Dr. Giles said that he had had to operate twice during pregnancy for the removal of fibroids showing red degeneration. In each case the indication for the operation was acute pain, thus bearing out the observation of the authors of the paper. In one case the pain was so acute and definite that he opened the abdomen expecting to find a small ovarian tumour with a twisted pedicle; it turned out to be a fibroid the size of a fist in the wall of the uterus. In both cases the tumour was enucleated by myomectomy without disturbing the pregnancy, which went on to full term.

Mr. BECKWITH WHITEHOUSE said that a point of considerable interest to him was the fact that only six out of the fifteen cases brought forward by the authors had been associated with pregnancy. This was a small proportion and coincided with his own experience. Certainly the last five specimens that had come under his notice had had no relation whatsoever to pregnancy. Another interesting point raised by the authors was the occasional association of the tumours with micro-organisms. From recent experiments that he had made he was surprised that secondary infection was not more frequent. In several large fibromyomatous uteri that he had investigated from a bacteriological standpoint he had cultivated staphylococci from the endometrium. This was of interest because they were present in the absence of any inflammatory lesion, either in the endometrium or in the fibromyoma. They appeared to be simply resting upon the tissues, but would undoubtedly gain access to the same under less favourable conditions.

Dr. FLETCHER SHAW, in reply, thanked the President and the Section for the kind way in which they had received this communication. As there was little time in which to reply, owing to another paper having still to be read, and as so many questions had been asked, some of which had been answered by subsequent speakers, he would not attempt to reply to each speaker individually. The authors considered the sequence of changes in these tumours to be: (1) Thrombosis occurring in a fibroid already degenerating; (2) accumulation of fat owing to the retardation of the circulation; (3) hæmolysis from the action of the fat. What caused the thrombosis he could not say. At the time their first paper was written they thought the cause must be associated with pregnancy, but in this larger group of cases the occurrence with pregnancy was much less frequent; still, as Dr. Giles pointed out, six cases out of fifteen was a large proportion, and the cause would probably be more often found in pregnant than in non-pregnant women. The diagnosis of these cases was very interesting and could generally be made when much abdominal pain or general malaise occurred in a patient with a fibroid: since finishing this paper Dr. Shaw has seen two cases with this condition which he diagnosed prior to operation. The only treatment was operation; if left these tumours readily became infected. It was owing to the symptoms causing early operation that the later stages of this condition were not often seen. The authors considered thrombosis the distinctive change in these cases which had never been observed by them in other degenerating fibromyomata, though they had examined many for this condition. He looked upon the second group as due to a definite overgrowth of thin-walled vessels—angiomatous degeneration.

The Cause of Internal Rotation of the Fœtal Head.

By James Young, M.D.

Internal rotation of the fœtal head occupies a position very similar to many other questions with which we are constantly brought into contact in our daily routine. It occurs with such ease and in association with circumstances of apparently such an easily definable nature, that it seems at first sight almost querulous to look for any but a self-evident explanation. The more one studies the subject the more one finds, however, that it is by no means self-evident.

In the first place, there can be no doubt about the fact that the soft parts of the pelvic canal have an intimate bearing on the process. This is shown by the experiment of Dubois, who opened the uterus of a woman, who died shortly after her confinement, and placed the fœtus in the birth canal in the occipito-posterior position. On forcing it down it was found that forward rotation had occurred, and delivery took place with the occiput directed to the front. This was found to be the case in three trials; at the fourth, however, rotation failed and the head was born with the occiput behind. By employing a larger head, however, rotation was again seen to occur. The same thing was demonstrated by Edgar, who screwed a swivel into the fœtal head and, by attaching to this a length of cord, was able to drag the head through the pelvis of a woman who had been confined a short time before. The occiput invariably rotated forwards, even from the posterior position, until the pelvic canal began to lose its resistance, when the forward movement failed. These two sets of similar experiments demonstrate that the elastic resistance of the structures of the pelvis is necessary for the forward movement of the occiput, and that when these become stretched and relaxed the process is arrested. The fact, however, that a larger head will exhibit the process in the stretched canal suggests that a close fit between head and canal is the essential.

The pelvic canal during labour may be considered to be a curved cylinder. Before labour the walls of this cylinder, except in its upper level, where it is occupied by the head, are in contact and, in their descent, the fœtal parts continually and gradually displace the tissues on each side, so that just after the birth of the head the potential cylinder has become a curved canal of more or less uniform diameter.

FORWARD ROTATION OF THE HEAD IN OCCIPITO-POSTERIOR POSITION.

Any explanation of rotation of the fœtal head must account for the remarkable process by which, in most cases, there is obviated the dangerous jamming of the head, which is apt to occur in occipito-posterior cases where the position remains unaltered. As the mechanism of the whole process is best explained by a consideration of these cases, I shall discuss them in the first place.

The principles underlying the change will be conveniently and lucidly brought before the mind by the contemplation of a simple mechanical model. When a firm cylindrical body of suitable size, which closely fits a curved cylindrical canal, be forced along this canal, it is made to continually alter its position. This is due to the fact that the lower end is carried more and more forward by the posterior wall of the canal as the body descends, or, more accurately, the body descends because of the forward wheeling of its lower end. If the mobile cylinder does not fit the canal but moves freely in this, then, if it be placed obliquely, and if it be too large to escape "side on" it is clear that, if it be pressed downwards, descent will occur only if its oblique axis be made to come into a line more parallel with that of the canal. This will readily happen, for the backward pressure of the anterior wall of the canal above, and the forward pressure of the posterior wall below, will, by tilting the two ends, readjust the axis of the movable body as descent takes place.

If now we can imagine the same body placed in the same oblique manner with its two ends mesial in position but fixed to a rod which passes down in the canal and is jointed to the upper surface of the cylinder, it is clear that the backward acting force above and the forward acting force below will now be of no avail in readjusting the cylinder's axis if the fixing rod be held tightly in its place. Place it so that, instead of occupying a mesial position with regard to the canal, it comes to deviate to one or other side and occupy a diagonal position; the pressure along the fixing rod, which all the time is held in the same position relative to the canal, will find a response in an altering of the axis and a descent of the cylinder, for now the pressure of the walls of the canal acting on the two ends will rotate the body, and this rotation will become greater and greater as the descent occurs. This rotation depends upon the existence of pressure in opposite directions at the two ends which are eccentrically placed with respect to the fixing rod. Rotation will occur round the axis of the rod. In fact, just in proportion as the rotation occurs the axis of the solid cylinder will move more nearly parallel to the axis of the canal, which we have seen is necessary for descent. This will take place to a degree strictly corresponding to the extent of the rotatory movement. The eccentric forces acting on the ends of the cylinder will be greater or smaller according as the force acting along the rod is greater or smaller. During these experiments it is assumed that the fixing rod is held in a uniform position with regard to the sides of the canal; if not, and it is allowed to move to and fro, the solid body will simply correspond to the mobile cylinder in the first experiment. The truth of these descriptions anyone can convince himself of in a few minutes by the employment of a simple working model, such as I have described.

A resemblance will be noted at once between this model and the fœtal head in the pelvis. Fundamentally the analogy is complete, as I hope to demonstrate. The head of the fœtus may be described as a cylindrical body which is joined to the neck and whose long axis extends between chin and occiput. The cylindrical shape of the head becomes especially manifest during labour by the moulding in response to the pressure of the maternal passages which diminishes the transverse diameters and lengthens the longitudinal. The larger the labour and the greater the pressure to which the head is subjected, the nearer does the head approximate to a complete cylinder. Movement of this cylinder at the atlanto-axial joint is ordinarily free, but in the pelvis the latitude of this movement becomes restricted by the position which the head is made to assume. Where the head lies in the pelvis, as it does under ordinary circumstances, in the flexed position, the first action of the encircling walls of the canal in the presence of the downward propelling force must be to tilt the cylinder as nearly as possible parallel to the long axis of the canal. So long as the head is placed so that its " side-on " position prevents any descent, this tendency will manifest itself, and will only cease when the limit to which it can occur has been reached.

I shall discuss again more fully what this action means in the case of the occipito-anterior positions. In the meantime, it is clear that in the posterior occipital position it must mean an increase in the flexion, and this will continue till it is prevented by the chin coming against the chest wall. We now have the head occupying a position similar to that of the cylinder obliquely and diagonally placed in the canal. It is a cylindrical body, the upper pole of which, in the ordinary condition, is lying to the left of the middle line in relation to the left side of the upper pelvic wall, and the lower pole of which is placed against the posterior wall of the canal at a considerably lower level. The exact position of the lower pole will be discussed later. As in the imaginary cylinder referred to, the two poles will be constrained to move, the upper in a backward direction, the lower in a forward direction, by the influence of the walls of the canal. In other words, the fœtal cylinder is being acted upon in a way exactly similar to that which results in an increase in the flexion. The forces are the same, and a clear realization of this fact helps one to understand the mechanism of rotation. In each case the solid cylinder in its attempt to pass along the curved cylindrical canal is being forced to tilt so as to bring its axis parallel to that of the canal.

When flexion has accomplished what it can in altering the axis in the necessary manner, the obliquely and diagonally placed head will correspond to the imaginary cylinder which we have considered. The two ends are placed eccentrically and the pressure on the ends acting, the one forward and the other backward, will tend to rotate the head round the axis of the cranio-cervical line. The rotation will permit of descent to a corresponding degree. But the process is not quite so easily described as at first sight it would appear to be. This I shall refer to immediately. In the meantime, it should be remarked that, whilst it is necessary in description to isolate in the mind the movements, the one from the other, this arrangement gives an appearance of sequence to alterations which are occurring synchronously. The rotation is associated at every movement with a corresponding descent and vice versa. The same is perhaps true of the flexion. It seems possible that there will be a certain amount of rotation of the head before the flexion is completed. In such a case the change in position of the head would be the sum of three simultaneously occurring movements—namely, flexion, rotation, and descent. On the other hand, it may be that the force necessary to start the rotation may be greater than that necessary to complete the flexion. In such a case the flexion would be accomplished in an earlier stage of the labour, and not till stronger uterine effort sets in, with a corresponding increase in the forces acting eccentrically on the poles of the head, will rotation commence.

After the more or less abstract reasoning set forth in the previous pages had convinced me of the true nature of internal rotation, I saw that, determined as it was by simple mechanical laws, it should be subject to practical demonstration. If the rotation of the head is dependent upon the fact of a solid cylinder placed in a certain way in a curved cylindrical canal so that its movements are restricted except in certain directions, it seemed that by imitating these conditions the process should be demonstrable on a model. After several trials I have succeeded in preparing such a model.

The fœtal head (fig. 1) is represented by a firm body of a similar shape attached to a plate so that it is fixed in a position of flexion. In the metal support passing between the upper surface of the head and the plate there is a joint, which allows of only one movement—namely, rotation round the axis of the rod. The rod is fixed to the base of the head at its centre. The plate is circular and, whilst being slightly under the diameter of the cylindrical tube to allow of its ready passage along the tube with the head, it has only very slight lateral movement, and, when fitted into the canal, it completes the analogy with the conditions in Nature. Its action corresponds to that of the neck and body of the fœtus, which, passing into the pelvis alongside the head, restrict its movements. The curved cylindrical canal (fig. 2) to represent the pelvis is made of tin, which is convenient because it can be easily moulded in two pieces round a wooden block cut out to a suitable shape and size. The head is of such a size that when placed in the canal with the chin in the middle line behind and the occiput below and to the front, it will pass along the canal with only a comparatively slight force from behind. When, then, the head is placed in the canal to correspond to the right occipito-posterior position it is found that, on being gradually forced along till it emerges at the other

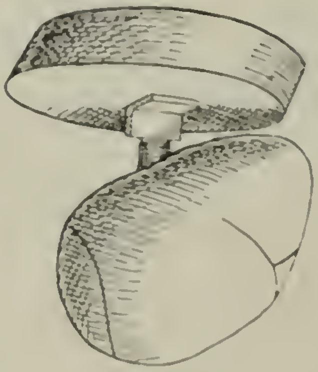


FIG. 1.

Model representing flexed fœtal head. In rod attaching head to circular plate there is joint permitting rotation. It will be seen that the greater part of the head, when so flexed, is on the sincipital side of the line of rotation if we imagine this projected to the vertex.

end, it has undergone a rotation so that the sinciput instead of being directed to the front is now behind. The occiput has rotated in a corresponding manner. The rotation is rarely quite complete, but I have discovered that the degree of completeness is, as one would expect, dependent upon the length of the curved canal, and, by having a canal of sufficient length to correspond to the pelvic cylinder, as continued forward by the expanded perineum and pelvic floor (fig. 2), one can obtain complete or almost complete rotation. It should be remembered in this connexion that, in Nature, the rotation of the head is rarely quite complete.

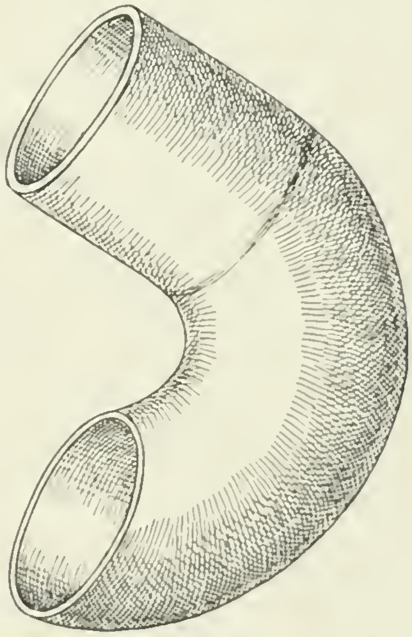


FIG. 2.

Curved cylinder representing pelvic canal. The oblique line encircling it indicates the pelvic brim. The straight part above this is necessary to receive the head.

By closely studying the working of the model we shall best understand what, I believe, are the causes underlying the process. The advantage of this will be apparent when I say that several of the points which before seemed almost hopelessly baffling have with the study of the model become clearer and clearer. By watching the descent of the head in the model, it is seen that the occipital end, to begin with, lies against the back wall of the cylinder on the right side, and that throughout it maintains the same relative position in the canal. In other words, there is no marked displacement occurring here during descent. If lines be drawn along the head to represent the sagittal and occipital sutures, the exact movements can be followed. It is noted that, with descent, the sagittal suture swings more and more transversely across the cylinder, and as the head emerges it is directed upwards, backwards, and to the left. Its lower end retains the same relative position to the right postero-lateral wall. At the same time, with descent, more and more of the occipital bone becomes directed towards the front. This corresponds to the change in Nature and which gives the movement its name. At the same time it is clear from the model that this movement is very small in amplitude.

If the spot where the cranio-cervical line (the rod between head and plate) cuts the vertical surface of the head be marked it will be noted that there is little alteration in its position as descent occurs; at the end of the process, it is found to have retained its same interval from the mid-line. This is equivalent to the statement that the rotation is occurring round the cranio-cervical articulation. It will be noted that the movement with the greatest amplitude by far is the large sweep encompassed by the anterior end of the head. At the same time it is easy to satisfy oneself that this part of the head is throughout subjected to considerable backward pressure.

If we now examine the flexed head we see what these movements mean (fig. 1). We see that the part of the head in front of the cranio-cervical line is much greater than that behind it, so that any eccentric pressure will have much greater effect in producing rotation when it is exercised along the anterior or sincipital region than when it plays upon the occipital ends. This rotatory action is easy to understand when the head is lying in the occipito-posterior position. It corresponds to the mechanism which we have already discussed in the obliquely placed cylinder, by which the upper and lower ends are coerced to move, the one backwards and the other forwards, as descent occurs, in a readjusting of the long axis of the cylinder to the long axis of the canal. Fixed, as it is, by the cranio-cervical line and prevented from flexing by the pressure of the chin against the body, the only way in which this readjustment can occur in the case of the head is by rotation round the cranio-cervical joint.

It should be carefully noted that the forwardly displacing force acting at the lower end when the head is placed in this way can be of only comparatively small importance in the process.

ROTATION IN OCCIPITO-ANTERIOR CASES.

When, then, rotation occurs, descent to a corresponding extent takes place, and it is easy to see that the action as outlined here will be present until the chin rotates back to the side of the pelvis, but it is not so clear how it is that the rotation takes place after this point. In the first place, it will be noted that the more the occipital end rotates round, the less and less marked will the eccentric force at this part become. A glance at the model will show why this is. As the occiput comes more and more round, the eccentric portion of the head to the right of the cranio-cervical line leaves the back wall of the cylinder, and the part of the head immediately behind the line of rotation comes more and more to be the part resting against the wall, and therefore the part subjected to the forward tilting pressure. Very soon, in fact, the eccentric forward force at this end, which can throughout never be of great rotating value, ceases altogether. If rotation is to continue we must look to the sincipital end. There may, however, be a slight eccentric rotation force at the lower end exerted laterally by the canal walls. This will be referred to again. It can only occur after rotation has occurred to the extent of carrying the occiput so that it is directed obliquely forwards. As the head is grasped all round by the soft parts, it is unlikely that there can be any appreciable difference in the lateral pressures.

If we examine the model we shall see that *some region of the front part of the head is throughout closely opposed to the front wall of the canal and even when the sinciput itself has rotated to occupy a postero-lateral position.*

It will be noted that the curvilinear nature of the canal means that, every moment, no matter to what extent descent has occurred, the part of the head lying in relation to the front wall of the cylinder and on the sincipital aspect is firmly pressed against the wall of the canal. This it is which continues the backward rotation of the anterior end of the head, and conveyed to the hinder end, carries the occipital bone farther and farther to the front. No matter, as I have said, what the level of the canal reached by the descending head, so long as it is placed obliquely in the pelvis, so long will it be subjected to this eccentric force carrying back the sinciput. It will cease only when the sinciput and occiput lie one behind the other, that is, when the axis of the descending solid cylinder has completed its adjustment to the curved canal.

But here it may be asked, while it is admitted that there must be this backward pressure dependent upon the curved nature of the canal, can you be certain that it is always eccentric? The answer to this is that, so long as the lower end of the head is placed against the back wall of the canal (and we know that it is so throughout), so long must it be the case that the obliquely placed head must come against the front of the canal wall eccentrically. This must be so, when the sinciput is directed forwards, and, when the sinciput rotates round to a posterior position, we have seen that the occipital end lies against the posterior wall approximately opposite the cranio-cervical line. This being so, the head sloping upwards and to the left from this region can touch the front wall (and touch it it must) only in an eccentric position. This position, where the side of the head touches the front wall, will be eccentric even were the lower end of the head to be placed mesially. The area of pressure will, doubtless, come progressively more nearly in front of the axis of rotation, but it will be eccentric so long as the head is obliquely and diagonally placed.

In the second place it may be objected that rotation backwards was only likely to occur to any extent when the head was completely flexed, and that flexion was determined by the spine being behind and the chin being in front, but that now with the chin behind the same conditions do not necessarily hold.

This brings us to the subject of extension of the head, which, as I shall show, probably commences whenever the chin has rotated round to lie vertically behind the occiput. In the meantime it may be pointed out that extension can never release the head on the sincipital side of the cranio-cervical line from the eccentric pressure, for extension means simply another way by which the long axis of the head becomes tilted parallel to the axis of the cylinder. I have shown that the true interpretation of complete flexion of the head, where the chin is forward, is that it is not so much necessary before rotation can occur as that it is produced by the same factor as determines rotation. It occurs more easily than rotation, and, for this reason, it is completed comparatively early in the process, and even before rotation starts. The same argument, I believe, applies to extension. It provides, doubtless, an important and necessary means by which the tilting of the head into the pelvic axis occurs in the later stages, but its occurrence does not preclude the similar effect as obtained by rotation. As it was between flexion and rotation, which are in reality essentially similar and due to exactly the same cause, so it is between extension and rotation. Here, however, it is almost certain that the rotation is the easier process and that, in fact, the extension does not occur to any extent till the rotation is well in advance. Whilst it is usually stated that extension begins only when rotation is complete, I believe that this is not wholly true, and that extension must occur at a comparatively early stage in labour; but then it occurs, as it were, against odds.

Before leaving the question of internal rotation two other points must be referred to. The first is that, whilst during a considerable part of the process there is no alteration of the cranio-cervical line with regard to the back wall of the pelvis, when the chin rotates back there will be a sufficient displacement forwards of the lower part of the neck to allow the chin to align itself directly behind the occiput. At the end of the process the axial line will be nearer the symphysis pubis. The other point is the allocation of the importance of the shape and the soft, distensible nature of the maternal passages, and the anatomical configuration of the bony pelvis. The latter has often been credited with the supreme rôle in the process. The only way in which it could exercise any active influence is by virtue of the transverse narrowing of the cavity toward the pelvic outlet. We have seen that the lower end of the head is placed against the back wall of the canal. The narrowing corresponds to the diameter passing between the ischia. As, however, the occipital end lies to the side of the middle line, and as we have to deal with a part of the head which is large in bulk, it is likely that some displacement does occur, but this will consist merely of a wholesale lifting of this pole nearer the middle line. It will occur only if the lateral deviation of the head makes the slightly "side-on" position, thus caused, interfere with delivery. Where the head is small or the bony outlet roomy this movement need not occur. There will be no rotatory action whatever, especially if, as is likely to be the case in a posterior occipital position, the occiput has not yet come forward at this level. As the rotation occurs whilst the upper end of the head is still comparatively high in the canal, it is obvious that this anatomical narrowing can have no influence in initiating the process which we have seen is determined largely and probably almost wholly by a swinging back of the sinciput.

With regard to the soft parts, it is no less difficult to put a proper valuation on the share they take. That the distensible, elastic nature of the maternal canal is important is proved by Dubois's and Edgar's experiments, to which attention was directed in an earlier part of the paper. From the description of the process, however, which I have given, it will be recognized that it is the curve of the maternal canal which underlies the rotatory movement of the head. That such is the case is proved by my model, where the rotation takes place in the rigid, unyielding cylinder. This, taken in conjunction with the Dubois and Edgar experiments, shows that the elastic nature of the passages is not essential to the process, but that in the natural condition it would seem to aid it in some way. It is impossible to believe that the actual rebound of the head from the distended walls, immediately after the cessation of the pain, can be responsible for the rotatory movement. We have seen that backward displacement of the sinciput occurs, whilst this is in a rigid part of the canal, and is in fact due to the unyielding nature of the wall. In addition, the region where the elastic recoil of the walls might conceivably aid the process—namely, in the occipital region—is just the region where any eccentric force thus called into play is acting at a disadvantage by virtue of the nearness of the eccentric part of the head to the line of rotation. I believe, moreover, that the rotation is initiated before the more yielding pelvic floor has been reached. Reference to a section of the pelvis shows that the posterior wall is so curved that it will carry forward the descending pole of the head, whilst the bony outline is complete, or almost so, behind. No, I believe that the chief importance of the continual elastic resistance offered by the soft parts to the head resides in the fact that it ensures that the fœtal cylinder is always closely embraced by the walls and thus, throughout descent, the lower pole is kept constantly in firm contact with a curving slope. The narrowing of the canal in front of the occiput must mean that this curve is, as it were, always at a maximum. It will thus be seen that the soft parts are important in that they provide this continual forward tilt. The cessation of the rotatory movement in the later trials in Dubois's experiments is due to the fact that the passages had become relaxed, that there was no longer the tight fit between head and pelvis necessary for rotation. The same fact was brought out in the course of my own experiments. To begin with, I employed a block of wood covered with several thicknesses of wool for the fœtal head. Whilst it was easy to ensure a tight fit by using a sufficient amount of wool, after forcing it along the canal several times it became compressed and diminished in bulk, with the result that rotation failed. Only by adding more wool was the rotatory movement restored.

It has been said that the soft parts, except by forming the curvilinear canal, have no specific purpose in producing rotation. The continual narrowing of the canal, or rather the opening out of the walls, before the advancing head, means that the line of least resistance is always towards the centre of the canal. We have seen that this keeps the lower end of the head continually tilted forwards. It will act likewise by tilting the head laterally. We have shown how the descending pole lies, to begin with, to the side of the middle line. The configuration of the soft canal, like that of the bony canal, towards its outlet, will thus tend to lift the head bodily towards the mesial line and thus enable it to emerge "end on" and not partly "side on." This is, however, quite a different process from rotation, although it is continually confused with it. That this lateral pressure can have only little or no rotary movement added to it is clear from the extremely small amount of the head which is eccentric at this level. In addition, the head is grasped all round by the distending canal, and it is thus difficult to see how there can be any difference in the lateral pressures on the head. In the model this mesially displacing influence of the lower pole of the head is absent because of the absence of the natural conditions. This is the only respect in which the model differs from the pelvis, as it is, I believe, the only respect in which it fails to reproduce the natural mechanism.

THE FUNCTION OF THE PELVIC FLOOR.

From what has been said the function of the pelvic floor will be recognized. It has no specific importance in the process greater than that implied by the part it takes in the formation of the pelvic canal. The pelvic floor is essential to the process, but it is so only because it continues onwards the curve of the pelvic cylinder, and, by closely moulding itself to the descending pole of the head, continues the forward tilting influence to which this is subjected. I have stated before that the forward rotation of the head in all probability commences before the soft pelvic floor is reached by the descending head. In fact, if one were to give any part of the pelvic canal superior prominence in regard to the rotary movement, this position would be given to the anterior wall of the canal.

EXTENSION OF THE FOETAL HEAD.

After what has been implied on previous pages, a few words are necessary by way of fuller explanation of the time when extension occurs. We have seen that, whilst the spine is behind and the chin is in front, the tilting of the sinciput and occiput in opposite directions will produce flexion and internal rotation. As soon as the sinciput becomes displaced so far back that it lies vertically behind the cranio-cervical line, there is no reason why a tilting of the head at the articulation should not occur. To begin with, this will consist of a partly sideward displacement, but, with the chin behind the occiput, this must mean extension. I believe that this is the time when extension sets in and that it will become more and more manifest as the sinciput rotates farther and farther back. It will, however, be well in process before internal rotation is completed. The extension is due to the same tilting action and the same necessity imposed upon the descending head of arranging itself parallel to the axis of the canal.

We thus see that the mechanism of the descent of the fœtal head is determined throughout by the same factor. Flexion, internal rotation and extension are all due to the same causes. This consists in the force directed along the cranio-cervical line calling into existence pressure between the walls of the canal and the two poles of the head. The pressure thus applied is such that at any moment it allows of descent only in proportion as the head is tilted into the axis of the curved canal.

ABSENCE OF ROTATION WHERE FLEXION DEFICIENT.

From what has been said on preceding pages we shall now be able to understand why rotation fails when the head is forced along the pelvis in an insufficiently flexed state. We have seen that the rotation is dependent upon the fact that the head is placed obliquely along the pelvis, and such that its sinciput is distinctly at a higher level than the occiput. Only then can the poles be brought under the influence of the tilting forces, which act eccentrically. The nature of a curved canal is such that if the one end of a cylindrical body is descending in relation to the posterior forwardly sloping wall, the other end, if placed distinctly higher and the body be too big to escape in the oblique position, comes against the wall in front at a region where it slopes backwards. If the body lie in the pelvic canal with the two ends at the same level, there can never be eccentrically acting forces called into play by a downward force directed at right angles to the axis of the cylinder. The more nearly the ends are placed at the same level the less will be rotatory action, which, within limits, increases in proportion with the distance in the vertical level between the two ends.

CASE OF BACKWARD ROTATION OF THE OCCIPUT WITH AN EXTENDED HEAD.

The model of the head used in the experiments might as readily be considered to correspond to an extended as to a flexed head. In this case the lower end would correspond to the sinciput. It is clear that if such were the case the rotation would be such as invariably to carry the occiput backwards. In this case the description of the process would be more accurate than that given to the ordinary rotation, for we have seen that it is the rotation backwards of the upper end which dominates the mechanism, and *not a rotation forwards of the occiput.* This to a large extent is determined by the backward sincipital movement.

ABSENCE OF ROTATION IN THE CONTRACTED PELVIS.

We have seen that where the fit between head and pelvis is not sufficiently firm, internal rotation is apt to fail. We have seen that this may be due, as in Dubois's and Edgar's experiments, to an increasing stretching and relaxation of the walls of the pelvic canal, or, as in my first experiments, to a compression and diminution in bulk of the fœtal head. This was the case when the head in the model was originally made of compressible material. The rotation may, on the other hand, fail where the head is relatively too large for the pelvis. This is apt to be the case in the small pelvis. Here, although flexion is well marked, rotation may fail. It may fail, indeed, because of the extreme flexion, for the more vertically placed the head is in the pelvis the less eccentric will the sinciput be, and the less will the rotary influence be called into play. Combined with this there will be great lateral friction between head and pelvis because of the tight jamming, and this will render the gliding movement associated with rotation difficult. In such a case the lateral pressure will tend rather to produce increasing moulding of the head, and this it is which will enable descent, if the head is not so big as to render this impossible.

EXPLANATION OF ROTATION IN FACE AND BROW CASES.

The model can be applied to these cases, and in each case will explain how the rotation occurs, the lower end being taken to represent the presenting part.

INTERNAL ROTATION IN BREECH CASES.

The explanation of rotation which I have given is equally applicable to breech cases. To understand the forward rotation of the lower buttock in these cases, it is necessary to recognize that, whilst rotation at a joint occurs during the process in head presentations, it is in no way essential. In head cases, as we have seen, the movement of the head round a longitudinal axis is associated with a true rotation of the head on the trunk, though even here there is something more, for it has been pointed out that there is a continually increasing approximation of the neck to the front wall of the pelvis. Though no doubt rendering the movement easier, the joint is so little necessary to the process that it would occur even if the head were firmly ankylosed to the trunk. The forces causing the movement would remain unaltered, and carrying forward the lower pole and backward the upper pole, they would simply cause a wholesale downward gliding of the head and body and a rotation round an imaginary longitudinal axis. The movement of the head would be identical to the rotation as ordinarily present. The sinciput, or any other eccentrically placed region of the head, would move in a spiral fashion as before.

The application of the same principles to the breech case will at once show that, where the buttocks are placed so that one is in relation to the pelvic wall at a lower level than the other, and the transverse diameter of the body lies in an oblique diameter of the pelvis, a similar spiral gliding movement will take place as descent takes place. For then the propelling force from above will call into play the eccentrically acting forces. The part of the body against the front wall of the pelvis will, with descent, be constrained to move backwards, and the buttock against the posterior wall and below will move forwards. If this buttock lies, as it will almost necessarily do, near the line of rotation, because of the oblique position of the body, the forward acting force will be only slightly eccentric or not at all so. Then the rotation will, as in the case of the head, be determined largely by the backward displacement of the upper buttock and the adjacent part of the back.

DISCUSSION OF PREVIOUS EXPLANATIONS OF INTERNAL ROTATION.

I have purposely reversed the usual order adopted in a contribution of such a nature as this. It is customary for the author to set out, to begin with, the work of previous investigators. I have adopted the present arrangement because, in the first place, the difficulties associated with the acceptation of previous explanations are sufficiently given in the text-books on midwifery and in previous papers, and, in the second place, because any criticism I have to offer will be bound up with some of the errors in description, the nature of which has been implied in the preceding pages.

The literature of the subject has been fully discussed by other writers. Among recent papers, perhaps the best and most complete in this respect is that of Paramore. For this reason I feel it unnecessary to cover the same ground, and I shall limit the criticism to the theories associated with the names of Schroeder and Olshausen, Sellheim, and Paramore. The explanations based upon the supposed presence of the inclined planes of the pelvis, upon the so-called perineal gutter, which directs the occiput forwards, &c., I have sufficiently referred to in the course of my paper.

Olshausen and Schroeder's Theory.

According to these authors, the rotation of the head is initiated by the rotation of the back of the child forwards, as the uterus becomes flattened during its contraction and retraction. The child moves so that the transverse axis of the body falls into the transverse axis of the flattening uterus. Bumm believes that the projection forwards of the vertebral column prevents the back, when this lies posteriorly, from rotating backwards, and even causes it to move continually farther and farther forwards. This rotation of the trunk transferred to the head explains the anterior rotation of the head in occipito-posterior cases. Olshausen, while believing that the rotation of the body initiates the rotation of the head, states that it does not explain everything, for he has found that the head rotates more quickly than the body. He therefore calls to his aid, to complete the explanation, the pelvic floor, and endows it with the directing influence so often associated with it, and which I have attempted to show does not exist in the specific manner ordinarily described.

Against the conception that the movement of the body has any important bearing on the rotation of the head may be urged the fact that the configuration of the pelvic canal dominates the process, for it is such that, unless the head adjusts itself to the pelvic diameters, jamming is inevitable where the fit is close. This is demonstrated in two different and convincing ways. In the first place, during delivery of the head with forceps it is often easy to recognize that the descent is accompanied by a continually increasing rotation. In an occipito-posterior case especially, it is often noted that only after vigorous traction is any impression made on the head, and in its descent a continually increasing forward movement occurs. This I have noticed in those cases where the delivery was being conducted under the impression that it was a normally lying head, and where the rotation, through a large circle, was the first intimation of the posterior position of the occiput. (As is well known, it is difficult in many cases to recognize the lie of the head after moulding and the caput formation have obscured sutures and fontanelles.) It is impossible to believe in such a case that it is the retraction of the uterus which is responsible for the process, for it is present even where the uterine contractions are feeble, and to move a head so tightly grasped by the pelvis a very considerable force is requisite, a much greater force than is represented by the uterine effort. In fact, it is not till the traction on the head supplements this *vis a tergo* that the descent and the rotation occur.

In this connexion also it is well recognized that the rotation is most apt to occur in those cases where the fit between head and pelvis is tight, whereas if the head movement were secondary to the rotation of the body it should occur most readily where the head is small, which, as we know, is not the case. That the configuration of the pelvic canal determines the process is shown, in the second place, by the experiments of Dubois and Edgar, which are referred to in an earlier part of this paper. These show that the forcing of the head through the pelvic canal it is that determines the rotation, for it takes place after death when the uterus is laid open, and where the rotation of the body by the uterine effort is absent.

Finally, Olshausen has admitted that the structures of the pelvic canal are necessary for, and play an active part in, the process. This being so, and it having been demonstrated that the canal can start and complete the process, the rotation of the body at once is thrown into a secondary position in any explanation of the movement unless we are prepared to admit that the same results can be obtained by two widely divergent factors.

Sellheim's Theory.

According to this author, the rotation is determined by the fact that, if a cylindrical body of unequal flexibility in different regions be forced along a curved cylindrical canal which it fits closely, it will rotate till the cylinder is so placed that the bending necessary for its passage along the canal occurs in the readiest manner. How this law is supposed to operate is seen by a study of the fœtal head. Sellheim, by measuring the flexibility of the head in different directions after birth, showed that the head could be bent backwards more readily than in any other direction. Not only so, but when the head is flexed, the extensor muscles of the neck are thrown on the stretch, and continually tend to draw the head into the extended position. The greater the flexion, the greater will this extending force be. Sellheim has prepared a model incorporating these ideas. The pelvic canal is represented by a curved elastic cylinder, and the head by a suitably shaped and sized solid object, which moves in all directions on the block representing the body. By means of springs, which reproduce the hypothetical action of the extensor muscles of the neck, the head continually tends to spring into the extended position when it is flexed. When forced along the curved canal, rotation is obtained. This, according to Sellheim, is determined by the occiput being forced against the pelvic canal, and, in the attempt of the head to extend, an eccentrically acting pressure is called into existence, which, at the elbow of the canal, rotates the head forwards.

This, I believe, is the first mechanical model to reproduce rotation; but does the explanation given by Sellheim necessarily account for it? In the first place it may be pointed out that the existence of the springs in no way affects the essential mechanism of the process. The configuration of the canal in itself must tend to tilt the lower end forwards as descent occurs. The springs, doubtless, by virtue of their effort to straighten out the head, will mean an added forward tendency in the shape of the recoil of the occiput from the wall of the canal, which their presence implies, but they can in no way bring into being a new force of rotation. This being so, the same movement should be possible where they are absent, and that this is so I have shown by means of my model. Sellheim's model works not because of its complexity but in spite of it. It gives rotation because it reproduces the two essentials—the flexed head, which fits the canal tightly and which rotates round a longitudinal axis, and, in the second place, the curved canal. I believe, moreover, that the account of the process which I have given on preceding pages will apply equally to Sellheim's model as to my own. The rotatory movement in both is determined largely by the eccentric backward pressure called into play by the anterior wall of the canal continually constraining the part of the head lying uppermost—i.e., the part on the sincipital aspect of the axis of rotation—to move backwards to allow of descent. The forward tilting force below, whilst aiding the process, is probably only eccentric to a small degree.

As Paramore has pointed out, it is impossible to conceive that the comparatively very feeble muscles of the neck and back of the child can produce an action such as would correspond in any degree to that of the springs in Sellheim's model. Especially is this so in view of the fact that, as Dubois's and Edgar's experiments prove, the rotation can be reproduced after the death of the child.

Paramore's Theory.

According to this the rotation is determined by the fact that the pelvic floor presents a marked resistance to the lower pole of the head. As it is "pinned against the pelvic floor by the force from above" and, as the line round which rotation occurs passes through the vertex, the rotatory movement is not determined by any force acting at the lower pole. In occipito-posterior positions the sinciput lies against the front wall and is eccentric. The force from above will thus call into play a force moving the sinciput backwards, and this will be possible because at the upper levels of the pelvis the transverse diameter is wider than the oblique. After the forehead has moved into the transverse diameter the continuation of the movement of this region of the head backwards is determined by "a lesser resistance between the side of the head facing the sacrum and the posterior parts of the pelvis than exists between the forehead and the lateral pelvic wall."

In so far as it emphasized the importance of the upper pole of the head I believe that Paramore's theory was the first to approximate in description and interpretation to the truth. That the pelvic floor should be endowed with the property of fixing the vertex, which Paramore emphasizes as important to his theory, seems to me to be non-essential. In any case, the fact that the rotation is reproduced in a rigid canal, which can act only by continually carrying onwards and forwards the lower pole, shows that any such specific action of the pelvic floor is unnecessary. The same may be said with regard to the other part of the theory which gives a place of prominence to the inequality in the pelvic diameter towards the brim. It is clear that the rotation backwards of the sinciput implies in no way the necessity of any greater space than it has just left. Here again the movement is reproduced in the rigid canal of my model, where the diameters are intentionally made uniform throughout.

DISCUSSION.

The PRESIDENT (Dr. Amand Routh) thanked Dr. Young for coming from Edinburgh to demonstrate his views on this important question. Members of the Section well remembered the valuable paper read by Dr. Young in 1910 on the uterine mucosa, and his views on the action of the chorionic cells had since then been almost universally adopted. He hoped that those who had strong views on the subject now before them would join in the discussion.

Dr. W. S. A. GRIFFITH congratulated Dr. Young on the admirable demonstration of the act of rotation which he had given, and pointed out that any theory which applied to rotation of the head must be also equally applicable to the shoulders and breech. There were clearly three factors necessary for rotation: (1) Sufficient driving power; (2) reasonable relation in point of size between the part of the child which had to rotate and the channel through which it had to pass: (3) a sufficient resistance to the passage of the fœtus. If either of these three were absent rotation would usually fail. The resistance in the model was chiefly that of friction, which was reduced to a minimum in an actual birth. He criticized Dr. Paramore's view that rotation was due to the shape of the brim and not to resistance in the pelvic cavity. Dr. Paramore used two arguments in support of this, neither of which Dr. Griffith was prepared to accept as true—viz.: (1) That the available space transversely at the brim of the pelvis in labour was considerably greater than that antero-posteriorly, the psoas and iliacus muscles in action, as a matter of fact, greatly diminishing the available space transversely; (2) that rotation did not take place in the so-called small round pelvis. Dr. Griffith knew no evidence of this so long as the size of the fœtus corresponded with the size of the pelvis, as it usually did in the races where the so-called small round pelvis was the normal for that race.

Dr. R. H. PARAMORE said he wished to thank Dr. Young for bringing this interesting and at first sight somewhat difficult question of the cause of the internal rotation of the fœtal head before the Section. Some four years ago Dr. Paramore had worked this problem out for himself, and was glad to find Dr. Young, who had kindly referred to his paper, agreed in two important particulars with his conclusions. These were that the presenting part of the head in the process of descent and extension, and as rotation was occurring, retained its mesial position in the curved axis of the birth canal; and that the forehead, being the part of the head most distant from the cranio-axial line through which the pressure from above was transmitted, and so coming into closer relationship with the limiting wall of the pelvis than other parts of the head, was the part which was affected most by the resistance of the pelvic walls and the part which determined rotation. Dr. Paramore believed he was the first to show that the forehead played this prominent part in rotation, that rotation was caused, not by the occiput being circumferentially pressed forwards, but by the forehead being circumferentially pressed backwards. But whilst Dr. Young and he were agreed on these points, they differed as to the part played by the pelvic floor and the shape of the pelvis. Dr. Young believed the pelvic floor played no part in the rotation except in so far as it continued the curved course of the birth canal; and thought the curvature of the course through the pelvis was the only reason (as far as the pelvis was concerned) that rotation occurred. Dr. Paramore took quite a different view. He thought the pelvic floor, by resisting the advance of the fœtal head, caused the part presenting to be more or less fixed mesially (that is, prevented it moving laterally); and that owing to its continued resistance it maintained this part centrally as descent, rotation and extension simultaneously occurred. The vertex being thus maintained in the median plane of the pelvic outlet, the continuance of the pains thrust it against the pelvic floor, which deflected it anteriorly towards the pelvic floor aperture and pubic arch; and in occipito-posterior positions, in true vertex cases, in which the forehead was therefore at a much higher level and opposed to the ascending pubic ramus, the forehead was thus pressed more and more against the antero-lateral part of the pelvic wall in the region of the brim. Owing to the fact that in normal cases the transverse diameter of the brim is greater than the antero-posterior, tangential forces came into play, and caused the forehead to glide into the larger transverse diameter. This lateral movement of the forehead permitted the vertex to be impelled more forwards into the pelvic floor aperture, so that with it descent occurred and the forehead itself came lower in the pelvis. But as the outlet was reached the antero-posterior diameter of the pelvis increased, whilst the transverse diminished. The continued thrust forwards (extension) of the vertex by the obliquely inclined pelvic floor, now bulging downwards, prevented the forehead from returning from the lateral into an anterior position, but caused, by similar tangential forces, that it should turn towards the hollow of the sacrum. The part played by the pelvic floor was clear; by maintaining the vertex medianly it maintained the eccentric position of the forehead and caused it to come into pressure relation with the pelvic walls. That the shape of the pelvis played this part Dr. Paramore thought was shown by the fact that rotation did not occur in the small round pelvis in which the transverse diameter especially was narrowed; and he understood it did not do so in the kyphotic pelvis. He thought Dubois's and Edgar's experiments showed that the pelvic floor played the part imputed to it, because after the first few times that the head in the experiments referred to had been thrust or pulled through the pelvis, rotation failed to occur. He was at a loss to understand why rotation should not have occurred if it was only due to the curved course of the pelvic canal, for the bony part, to which Dr. Young attributed so much importance, certainly remained intact. In reply to Dr. Griffith, Dr. Paramore said, though it was true the psoas muscles did encroach upon the transverse diameter of the pelvic brim, the contention that their contraction could prevent the forehead coming into pressure relation with the bony wall, especially antero-laterally, as in vertex cases with the occiput posterior, could not be maintained. Even though the muscles were contracted, they could be displaced laterally, especially when we remembered the fœtus was being thrust downwards by powerful uterine contractions, plus the violent expulsive movements caused by the thoracic diaphragm and abdominal wall. It was well known that in some cases the head, even when not flexed, entered the pelvis with its long diameter in the transverse diameter of the brim. In these cases Dr. Griffith's contention, if sound, would also apply: but it was obvious the psoas muscles did not prevent the entry of the head in these cases. To the other criticism of Dr. Griffith, Dr. Paramore said internal rotation was not a *sine qua non* of childbirth. Delivery could take place without it, and the only reason obstetricians wanted the occiput to come anterior was that the head might pass through the pelvic floor aperture and the subjacent perineal and vulvar tissues, with its smallest diameters, so that the smallest injury possible might be sustained by these structures.

Dr. JAMES YOUNG, in the first place, thanked the President for the kind reference he had made to his work. With regard to Dr. Griffith's criticism, he agreed that any explanation of internal rotation must succeed in explaining the rotation in face, brow, and breech cases. He submitted that his explanation and working model not only did not fail to account for the movement in such cases, as Dr. Griffith stated, but that they actually showed in a way which no other method did the cause of the rotatory movement in each instance. In all there was an obliquely and diagonally placed presenting part. The lower surface was against the posterior wall and the upper aspect of the obliquely lying presenting part lay against the anterior wall at a higher level. Whilst the tilting influence at the lower end carried this pole forwards, that at the upper pole carried this backwards. As these poles were eccentrically placed the only movement possible when descent occurred was a rotation round a vertical axis. In the case of the breech this movement was a movement of the whole body round an imaginary axis. In fact, rotation at a joint, which was possible and easy as far as the head was concerned, was not essential to the movement at all. A clear understanding of this fact was necessary before the true nature of rotation could be grasped. The model demonstrated the necessity of a rotatory movement where the presenting part, be it head or breech, was so placed that the regions where the fœtus touched and were pressed against the pelvis were below and behind and above and in front. Unless the long axis of the presenting part coincided with the long axis of the canal the tilting forces were bound to be eccentric. Dr. Paramore's criticism was very much a restatement of his own theory. Dr. Young believed that, whilst at first sight it might be supposed that the larger transverse measurement at the brim had an important bearing in permitting the backward gliding of the chin or upper part of the presenting part, it could certainly not account for the rotation when the head lay at a lower level, and, especially after the chin, &c., lay behind the transverse diameter. His own explanation had the advantage of showing that, no matter at what level the presenting part lay in the pelvis, so long as rotation was incomplete there would always be a part against the front wall of the canal which was eccentric and which would be pressed farther and farther round during descent, resulting in the increased rotation. Finally, Dr. Young maintained that his model fully demonstrated the truth of his explanation, for, after all, it was an experimental confirmation of abstract reasoning. He submitted that comprising, as it did, the two essentials present in labour, a flexed head and a curved canal, and exhibiting, as it did, a rotation of the head when forced along the canal, it must reproduce the essential features of the rotatory movement. If he had done no more he was perfectly satisfied.

Obstetrical and Gynæcological Section.

March 6, 1913.

Dr. Amand Routh, President of the Section, in the Chair.

A DISCUSSION ON VENTRIFIXATION.

The Indications for the Operation, with an Analysis of Seventy-seven Cases.

By W. S. A. Griffith, M.D.

Indications for the Operation.

The operation of suspension of the uterus is adapted for the relief of certain cases of displacement of the uterus where there is a failure on the part of the supports of the uterus to maintain that position which is necessary for the comfort of the patient, and to enable her to perform ordinary or laborious duties. While it is our common experience that many women do not suffer at all from some forms of displacement, or are relieved by the use of a properly fitted pessary, others are invalided by frequent pain and are unable even to stand or walk without great discomfort, and are completely incapacitated from any occupation or amusement which involves much exertion. The class of cases needing the operation may be divided into two:—

(I) Those in which the supports of the uterus are sufficient to maintain it at, or nearly at, its proper level in the pelvis, but in which retroversion or retroflexion of the body of the uterus and adjacent broad ligaments, leading to prolapse of the ovaries, is the cause of the serious discomfort.

(II) The cases in which prolapse of the uterus, broad ligaments, and ovaries is considerable, and is associated with varying degrees and forms of vaginal, vesical and rectal protrusion.

In both of these groups many cases are sufficiently relieved by pessaries, though some women, for various reasons, prefer the relief to be obtained by operation to the prolonged use of pessaries and the medical attendance and frequent douchings which are the necessary alternative. Such reasons include residence in a country where skilled medical attendance is not to be readily obtained.

The following appear to be clear indications for the operation :—

Class I.

The uterus is retroverted and more or less fixed by adhesions.

The uterus is and has been for a considerable time pressed down in the position of retroversion by a tumour, commonly ovarian.

After enucleation of a fibroid from a retroverted uterus.

The retroversion is complicated by prolapse and enlargement of the ovaries, so that one or both are a constant source of pain, unrelieved, and in some cases increased, by the pressure of the pessary. In these cases excision of a portion of the enlarged ovary, and sometimes its entire removal, is also necessary.

The retroversion or retroflexion is not kept in position by a pessary, owing to the small size of the vaginal cervix or the dilated condition of the vagina. In these cases the uterus is found to be retroverted or retroflexed on the top of the pessary.

In all these cases we may expect the patient to be cured, and if the method of operation has been well selected and performed there should be no relapse or subsequent complication even if pregnancy should follow.

I have performed the operation in one case of sterility, in which there was extreme retroflexion, after curetting and pessaries had failed to support the uterus, in a middle-aged lady whose husband was the last male of his line. I have since attended her in two confinements, both presentations being persistent occipito-posterior. The first I delivered with the aid of forceps, the second without. Both children are flourishing and the mother is perfectly well. The fixation did not appear to cause any trouble during pregnancy or at either confinement.

Class II.

In this class the operation is often needed, the prolapse of the uterus being accompanied by prolapse of the vagina, and in most cases great enlargement of the vaginal orifice due to stretching, and to laceration of the perineum and posterior vaginal wall, and there is nothing to support the pessary which is intended to support the uterus and vagina.

The large rings so frequently used do much harm by the greater dilatation of the vagina which they cause, and thereby preventing the contraction which is needed to diminish the prolapse of its walls.

The support which the operation gives to the uterus in this class is only a part of that needed for their complete relief, and I am accustomed to perform it at the end of the vaginal operation— namely, after curetting, partial excision, or repair of the cervix, if these are needed, and after the repair of the posterior vaginal wall and perineum, with anterior colporrhaphy if the cystocele is considerable.

Of the value of the fixation portion of the operation I have no doubt, and the replies of doctors, and of patients both hospital and private, and my examination of them, confirm my opinion in both classes of cases.

In the earlier stages of rectocele and cystocele, with prolapse of the uterus, the formation of a good perineum and fixation of the uterus is usually sufficient, but when either vaginal wall protrudes at all considerably a colporrhaphy is essential.

An examination of the patients, twelve months or longer after operation, is essential for a correct opinion as to the result. By doing so we meet with patients who, feeling neither descent nor discomfort, still have a recognizable degree of cystocele or rectocele, and others who, still complaining of discomfort and pains (though greatly diminished), present no recognizable uterine or vaginal deformity.

Fixation of the uterus in connexion with Cæsarean section, with the view of providing an extra-peritoneal route in the event of a repetition of this operation, appears to be quite unnecessary.

Some surgeons are in the habit of performing this operation in cases of retroversion in women of poor general health (who have no local symptoms) with the idea that the retroversion is a cause of the general feeble state of health, and it is desirable that this question be fully discussed. Most of us are probably of the opinion, with which I agree, that the condition of the uterus in these cases is merely a symptom, and in no sense a cause of the ill-health, and that it is undesirable to subject such patients to this operation.

TECHNIQUE OF OPERATIONS.

The method adopted in almost all these cases has been by two buried silkworm-gut sutures passed deeply into the anterior uterine wall, beginning just below the uterine attachment of the round ligaments downwards for about an inch; both ends of each suture are brought through peritoneum, rectus and anterior sheath at a distance above the pubes, chosen in each case according to the degree of prolapse of the uterus and laxity of the abdominal walls. The ends of each suture are brought through the anterior sheath of the rectus about an inch from the middle line quite close together, as this facilitates an accurate adjustment of the divided sheath of the muscle when closing the incision. These buried sutures have not, to my knowledge, given any trouble, and in the only cases in which I have had any opportunity long afterwards of seeing the results (hysterectomy for fibroids), I found a close and firm attachment without any fundal or other pedicle which may be a source of danger.

In performing Gilliam's operation (which I have only recently adopted, and have not yet sufficient evidence as to its reliability) my practice has been to bring the round ligaments through the peritoneum, rectus and anterior sheath in the same position as the silkworm gut sutures, and have selected this operation for young women only where there is no prolapse of the uterus and vagina. In one case in which I intended to do it I found the round ligaments so thin and fragile that I had to do hysteropexy.

Joseph Griffiths, of Cambridge, informs me that he had to remove a uterus for uncontrollable hæmorrhage some months after I had suspended it in this way, and found it well supported and in contact with the abdominal wall.

In one case of a single woman, aged 29, with chronic retroversion and prolapse of the ovaries, unrelieved by a pessary, I shortened the round ligaments by passing them through the broad ligaments and uniting them to each other and to the posterior surface of the uterus. A year afterwards I had to remove some calcified lymphatic glands in the neighbourhood of the cæcum and was able to see the uterus well supported and in normal position. The patient remains well and relieved of all her pains, for which she had been under my observation for over two years.

Of the seventy-seven cases recorded, four were performed after Gilliam's method: Hospital, Cases 17, 19 and 20; Private, Case 49. One by threading the round ligaments through the mesosalpinx and uniting them to the back of the uterus and to each other: Private, Case 36. All the remainder were fixed by two silkworm-gut sutures, as described above.

ANALYSIS OF SEVENTY-SEVEN CASES.

Class I.

(1) Retroversion with adhesions, 7 cases. Hospital: Cases 10 and 24. Private: Cases 1, 12, 15, 18 and 28.

(2) Retroversion and ovarian tumour, 7 cases. Hospital: Cases 1 and 12. Private: Cases 16, 19, 25, 47 and 53.

(3) After enucleation of fibroids, 3 cases. Private: Cases 10, 24 and 51.

(4) Retroversion or retroflexion with or without prolapse of ovaries, 17 cases. Hospital: Cases 4 and 17. Private: Cases 5, 7, 8, 9, 10, 11, 20, 22, 29, 30, 35, 36, 38, 43, 49.

(5) Failure of pessary to maintain retroverted or retroflexed uterus in position, 5 cases. Hospital: Cases 19 and 20. Private: Cases 3, 26 and 48.

(6) Retroflexion and sterility, 1 case. Private: Case 3.

Pregnancy and parturition after fixation, 3 cases. Private: Cases 3, 11 and 22.

Class II.

(1) Prolapse of uterus and vaginal wall, 22 cases. Hospital: Cases 2, 9, 11, 13, 15, 21 and 23. Private: Cases 2, 6, 14, 17, 21, 23, 27, 31, 32, 37, 40, 41, 44, 46 and 52.

(2) Protrusion or procidentia of uterus and vaginal walls, 16 cases. Hospital: Cases 3, 5, 6, 7, 8, 14, 16, 18 and 22. Private: Cases 4, 13, 33, 34, 42, 45 and 50.

Mortality: 1 death (peritonitis, private case 8); 76 recoveries.

ST. BARTHOLOMEW'S HOSPITAL.

Case 1.—July 10, 1908: E. M., aged 30; retroversion of uterus with strangulated ovarian tumour. Ovariotomy; hysteropexy. February, 1913: No reply.

Case 2.—December, 1908; M. T., aged 26; 2-para; prolapse with cystocele; rings failed. Perineum repaired and hysteropexy. February 1, 1913: No reply.

Case 3.—March, 1909: A. A., aged 47; large cystocele, retroversion. Perineum repaired; hysteropexy. January 29, 1913: No prolapse; no pain or trouble whatever.

Case 4.—April, 1909: G. A., aged 23; 0-gravid; prolapse since aged 16, of long cervix retroversion; prolapse of both ovaries; right ovary cystic. Right ovary removed; hysteropexy. February 1, 1913: All normal, no prolapse or tenderness of left ovary; sometimes pain in region of scar only.

Case 5.—June, 1909: L. R., aged 53; prolapse twenty-five years, ring useless; cystocele-colporrhaphy fourteen years before; partial relief for a time, now worse than before. Hysteropexy. January 28, 1913: Uterus and posterior vaginal wall normal; anterior protrudes a little; small ring; little discomfort.

Case 6.—October, 1909: E. K., aged 33; two years complete procidentia; perineum torn to sphincter. Perineum repaired; hysteropexy. February 2, 1913: No reply.

Case 7.—December, 1909: L. E., aged 17, single; 0-gravid; protrusion of uterus from vagina six months; ring useless; vagina very dilated. January, 1910: Colporrhaphy; hysteropexy. February 1, 1913: No reply.

Case 8.—December, 1909: E. B., aged 28; prolapse of uterus and vaginal walls since first child (four years). November 25: Repaired cervix, anterior and posterior colporrhaphy; hysteropexy. December, 1911: Some descent of anterior vaginal wall only; ring 2¼ in. January, 1913: No prolapse, little pelvic pain.

Case 9.—February, 1910: E. M., aged 51; 7-para; prolapse twenty-three years; perineum torn to sphincter; vagina dilated and lax; uterus retroverted. Perineum repaired; hysteropexy. January 28, 1913: Quite well one and a half years, then after lifting her sick mother some prolapse returned.

Case 10.—February, 1910: M. S., aged 29; 2-para; chronic inflammation of tubes and ovaries and appendix; uterus retroverted and adherent. Appendix removed; uterus released; hysteropexy. February 1913: No reply.

Case 11.—April, 1911: E. B., aged 31 (midwife); retroversion and prolapse seven years; much pain; perineum torn to sphincter; right ovary large and prolapsed; must stand to micturate; hard work. Perineum repaired; hysteropexy. January 28, 1913: Prolapse cured, but pain at commencement of menstruation and after long standing only.

Case 12.—July, 1911: M. A. G., aged 48; multilocular ovarian cyst; prolapse and cystocele. Left ovary removed; hysteropexy. February, 1913: No prolapse; no discomfort since operation.

Case 13.—October, 1911: S. R., aged 51; 11-para; prolapse of uterus; vagina dilated; perineum torn to sphincter. Perineum repaired; hysteropexy. January, 1913: No reply.

Case 14.—November, 1911: M. R., aged 34; prolapse with protrusion one year, ring useless. Perineum repaired and hysteropexy. January, 1913: No prolapse, pain, or inconvenience. Examination: All normal.

Case 15.—December, 1911: C. A.; prolapse, rings useless. Perineum repaired and hysteropexy. January, 1913: No reply.

Case 16.—April, 1912: A. B., aged 43; prolapse one and a half years since first child; rectocele; prolapse of uterus. Posterior colporrhaphy and perineum repaired; hysteropexy. January, 1913: No prolapse, 2¾ in. ring since operation, able to do all household duties, pain only on rising after long sitting. February, 1913: Examination—All perfect except some rectocele.

Case 17.—May, 1912: E. S., aged 38; menorrhagia, retroversion, prolapse of uterus and ovaries with much pain not relieved by pessary. Gilliam's operation after curetting. January, 1913: Uterus normal, bearing down pain and backache almost entirely relieved. Felt only at commencement of menstruation.

Case 18.—May, 1912: K. B., aged 50; prolapse twelve years; uterus retroverted; perineum torn to sphincter. Perineum repaired; hysteropexy. January, 1913: No reply.

Case 19.—May, 1912: S. R., aged 33; 3-para; retroversion, pessary no good; menorrhagia severe. Gilliam's operation after curetting. January, 1913: Dr. Apthorpe Webb, Cambridge, reports hæmorrhage and pain became so severe that hysterectomy was performed by Dr. Joseph Griffiths, who reports he found the uterus in contact with the abdominal wall, well supported. He found no disease to account for the symptoms.

Case 20.—May, 1912: K. P., aged 31, single; chronic retroversion and much pelvic pain for many years. Curetted; Gilliam's. January, 1913: No inconvenience except when sitting on a low chair; no menstrual or other pain; health much improved. February, 1913: Uterus normal position.

Case 21.—October, 1912: E. R., aged 50; 2-para; prolapse since first child, twenty-five years; rings failed; perineum torn to sphincter; cervix, deep lacerations bilateral. Perineum and cervix repaired; hysteropexy. January, 1913: Perfectly well; no pain or discomfort. February, 1913: Examined—Uterus, vagina and perineum normal.

Case 22.—December, 1912: E. T., aged 50; 4-para; last 1896; prolapse and much pain six years; rectocele; perineum torn to sphincter. Posterior colporrhaphy; perineum repaired; hysteropexy. January, 1913: Examined—No prolapse; no pain or discomfort.

Case 23.—December, 1912: A. T., aged 38; 6-para; prolapse six years; cystocele; retroversion; rings useless. Perineum repaired; hysteropexy; left cystic ovary removed. February, 1913. Examined—Only slight cystocele; no pain or inconvenience whatever, no trouble with micturition.

Case 24.—January, 1913: E. S., aged 35, single; left ovary removed at Guy's, 1906, for tubercular inflammation; since then much pelvic pain and menorrhagia; uterus retroverted, adherent. Uterus released and fixed to abdominal wall. January, 1913: Since July, 1912, feeling of pressure and some pelvic pain at times. Examination—Uterus well supported natural position.

PRIVATE CASES.

Case 1.—March, 1901: Mrs. E. C., aged 28; Dr. Hyla Greves, Bournemouth; chronic inflammation following an operation performed in South Africa; uterus retroverted, adherent, chronic inflammation of left ovary and tube. Uterus, tube and ovary released, fibroid enucleated; hysteropexy. 1909: Hysterectomy for fibroids; ovaries and tubes found healthy; uterus adherent to abdominal wall at seat of fixation.

Case 2.—May, 1902: Mrs. E., aged 38; 2-para; chronic retroversion and prolapse of uterus and ovaries for four years; pessaries no relief. Perineum repaired and hysteropexy; cystic right ovary removed. November, 1903: Some tenderness at scar; uterus well supported.

Case 3.—May, 1903: Mrs. W., aged 34; Dr. Golding B. Collett, Worthing; married two years; 0-gravid; menstruation normal; uterus acutely retroflexed; fundus in Douglas's pouch; cavity 3½ in. dilated, full of mucus. January, 1902: Curetted much thick mucous membrane; pessaries proved to be useless. May, 1903: Hysteropexy. 1905: February, gravid, due November 9; November 4, head in pelvis, occiput posterior, delay from anterior lip not being drawn up; good pains, anterior lip pushed up; occiput posterior persisted; forceps; male. 1908: April, gravid, due January 26; January 24, confined; occiput posterior; anterior lip again had to be pushed up; forceps not required. 1913: January 11, letter—Very well, no discomfort; both children very well.

Case 4.—April, 1904: Mrs. A., aged 48; Dr. Juckes, Horsham; very stout, perineum torn to sphincter; uterus procident; micturition very difficult. Perineum repaired; hysteropexy. Seven months later uterus well supported; micturition easy; cervix long and low. February 13, 1913, Letter from Dr. Juckes—After a year prolapse as bad as before, but no details given.

Case 5.—October, 1904: Mrs. M., aged 32, 0-gravid; Dr. Huxley; persistent retroversion and pain, not relieved by pessaries. Curetted and hysteropexy. January, 1913: Letter—Free from all pain since operation; no pregnancy.

Case 6.—October, 1904: Mrs. A., aged 34; Dr. Everley Taylor, Scarborough; 2-para; persistent retroversion and prolapse since first child, twelve years; pessaries three years, no good; uterus heavy. Curetted; perineum repaired and hysteropexy. 1908: Uterus normal position; much suffering from chronic arthritis and menorrhagia.

Case 7.—October, 1904: Mrs. C. S., aged 27, 0-gravid; persistent retroversion and prolapse of ovaries; no adhesions. Cyst of right ovary excised; hysteropexy. January 10, 1913: Very well; no pain; no pregnancy.

Case 8.—January, 1905: Mrs. E.; chronic retroversion of heavy uterus; both ovaries prolapsed and very tender. January, 1904: Right ovary large, cystic, and œdematous, removed; easy recovery. January, 1905: Left ovary prolapsed and larger; pessary unbearable. Hysteropexy; patient died third day, peritonitis.

Case 9.—April, 1905: Mrs. L., aged 38, 1-para; persistent retroversion of heavy uterus and constant pain not relieved by pessary. Curetted and fixed. A year after uterus normal in size and position, but she was very thin and in poor health.

Case 10.—October, 1905: Mrs. L., aged 40, 1-para; chronic retroversion of heavy uterus with prolapse of both ovaries, swollen and very tender; not relieved by pessaries. A small fibroid of the anterior wall enucleated and uterus fixed. September, 1905: Returned to India. March, 1912: More pelvic pain; uterus normal position, with a small fibroid.

Case 11.—November, 1905: Mrs. R., aged 26; persistent retroversion and prolapse of both ovaries, not relieved by curetting and pessaries; left ovary, containing a large blood cyst, removed; right ovary and both tubes healthy. Uterus fixed. May, 1907: Dr. Blomfield, Sevenoaks, reported confinement, without any complication; uterus normal position afterwards. February, 1913: Perfect health; no discomfort.

Case 12.—January, 1906: Mrs. C., aged 35; three miscarriages, three curettings; adherent retroverted uterus and recurrent attacks of inflammation of left appendages. Uterus freed from old adhesions; left ovary and tube removed; uterus fixed. January 16, 1913: Free from all pain and able to do everything.

Case 13.—1906: Mrs. Q., aged 42; eight children; prolapse of uterus and vaginal walls; no perineum. Perineum repaired and fixation.

Case 14.—February, 1906: Mrs. B., aged 43; perineum torn to sphincter; retroversion of uterus and prolapse of ovaries; cystocele; pessaries little good; perineum repaired by me in 1905. Fixation, 1906; many adhesions. July, 1911. Very well, but fibroids size of fist.

Case 15.—February, 1906: Miss F. D.; Dr. Hope Murray; old inflammation (? tubercular); adherent retroflexion and adherent chronic inflammation of ovaries and tubes. Uterus fixed to abdominal wall; ovaries and tubes buried in dense adhesions; some relief.

Case 16.—March, 1906: Mrs. M., aged 31, 2-para; dermoid cyst of left ovary and retroversion of uterus. Ovariotomy and fixation. February, 1913: Dr. Marks, Mumbles, informs me that she died two years ago from phthisis.

Case 17.—May, 1906: Mrs. K., aged 37; Dr. Euraght, Anerley; prolapse, menorrhagia bad. 1905: Curetted and perineum repaired. 1906: Backache and menorrhagia continued; less prolapse. Hysteropexy. January, 1913: Dr. Euraght reports at third month of pregnancy severe backache, preventing sleep; he induced abortion; now perfectly well.

Case 18.—July, 1907: Mrs. B. J., aged 30; adherent retroverted uterus; prolapsed adherent ovaries. Fixed uterus after release of uterus and ovaries.

Case 19.—October, 1907: Mrs. B.; right ovary cystic, behind uterus. Uterus fixed after ovariotomy.

Case 20.—January, 1908: Mrs. M., aged 34; chronic retroversion of thick-walled uterus; no fibroids; menorrhagia. Curetted; hysteropexy.

Case 21.—February, 1908; Mrs. A., aged 44; perineum torn; prolapsed uterus and anterior vaginal wall; eighteen years pessaries, some relief. Perineum and sphincter repaired; hysteropexy; ovaries normal. Fourteen months later, very well.

Case 22.—February, 1908: Mrs. H., aged 28; retroversion and prolapse of ovaries since last confinement, five years; twins twice; pessaries little relief. Repaired perineum and fixed uterus. 1911: Confined; child weighed 9 lb; perineum only difficulty. January, 1913; Very well, able to dance and play golf; no pain or discomfort.

Case 23.—March, 1908: Mrs. D. A., aged 43; prolapse of uterus and vaginal walls: perineum torn nearly through sphincter ani; uterus 4 in. Curetted, repaired sphincter and perineum, fixed uterus. January, 1913: Dr. Colby, Woking, reports results perfect; before operation an invalid, now as active as any woman; has no discomfort of any kind.

Case 24.—June, 1908: Mrs. J., aged 38; Dr. W. E. Manby, Bridport; chronic retroversion; ovaries and tubes healthy. Small fibroid enucleated; hysteropexy.

Case 25.—October, 1908: Miss C., aged 37; ovariotomy, 1894; chronic retroversion since. Uterus fixed.

Case 26.—October, 1908: Mrs. B., aged 33, 3-para; Dr. Balgarnie, Winchfield, Hants; retroversion chronic, pessary little good. Fixation; abdominal muscles very soft and loose, and uterus rather low afterwards. January, 1913: Dr. Balgarnie reports she is very well and has no trouble; can walk and dance during menstruation.

Case 27.—January, 1909: Mrs. W., aged 40; Dr. Wallis, East Grinstead; prolapse since first child, nineteen years; pessaries fail; perineum torn to sphincter; uterus retroverted and low. Perineum repaired and hysteropexy. Result: Uterus firmly supported; slight descent of urethra only; very complaining.

Case 28.—March, 1909: Miss B., aged 38; Dr. Wilson, Brook Green; chronic retroflexion adherent. Hysteropexy after release. January, 1913: Dr. Wilson reports health much improved, able to do all her work; some pain only during menstruation.

Case 29.—March, 1909: Mrs. W. R., aged 29, 1-para; Dr. Cockburn, Ealing; chronic retroflexion, deep laceration of cervix and perineum. Perineum and cervix repaired; hysteropexy. Returned to China.

Case 30.—May, 1909: Mrs. L. S., aged 28, Buenos Ayres; menorrhagia, chronic retroflexion and prolapse of ovaries; vagina very dilated; rings no good. Hysteropexy and curetting. Patient reports on March 7, 1913: "I have been perfectly well ever since, and without the slightest feeling of pain or discomfort in the parts operated on."

Case 31.—June, 1909: Mrs. B., aged 55, seven children; Dr. Fernand, Colombo; perineum torn to sphincter; prolapse of uterus and vaginal walls; abdominal walls all fat; little muscle; sheath of recti very thin. Perineum repaired and hysteropexy. January, 1913: Uterus and anterior vaginal wall are normal; posterior vaginal wall loose, and she wears a 2½-in. ring; no backache or noticeable prolapse; can walk four miles easily instead of 100 yards.

Case 32.—October, 1909; Mrs. L. S., aged 35, 3-para; chronic retroversion and prolapse since second confinement; vagina dilated; perineum torn to sphincter; pessaries four years, little relief; great depression; quite invalided. Perineum repaired and hysteropexy. January, 1913: Perfectly well, able to do everything; no depression.

Case 33.—October, 1909: Mrs. T. V., 2-para; prolapse of uterus and cystocele; menorrhagia. Perineum torn to sphincter. Curetted, perineum repaired, and hysteropexy. Six months later, well.

Case 34.—October, 1909: Mrs. M., aged 43, 8-para; Dr. James Mackenzie; complete prolapse fifteen years; pessaries little good; menorrhagia. Curetted, repaired perineum, and fixation; abdominal walls very soft; rectus sheath very thin. Eighteen months after, ring needed; abdominal walls still very loose.

Case 35.—November, 1909: Mrs. C. J., very thin and feeble; chronic retroflexion, prolapse both ovaries three years; pessaries unbearable; quite invalided. Hysteropexy. May, 1911: After six months in Lausanne with "suggestion" treatment, quite well; can walk eight miles and lead an active life without pain.

Case 36.—April, 1910: Miss M. K., aged 29; Dr. Lorraine, Castle Douglas; chronic retroversion; much pain, pessaries little good. After consultation with Sir A. Pearce Gould, I explored and removed appendix and fixed uterus, finding three calcareous glands near the cæcum; uterus fixed by passing the round ligaments through the mesosalpinx and uniting them to each other and to the back of the uterus. A year after, in consequence of her right iliac pain persisting, I removed the three glands after consultation with Sir A. P. Gould; at this operation the uterus was found to be in normal position, without adhesion to the abdominal wall. 1912: Perfectly well, active life, no pain.

Case 37.—May, 1910: Mrs. C. S., aged 34, Brazil; menorrhagia, prolapse, perineum torn through sphincter; vagina very dilated. Curetted, repaired sphincter and perineum, fixation; sterilized by removal of half of each tube and uniting uterine ends. Six months after: Very well; no prolapse.

Case 38.—July, 1910: Mrs. H., aged 34; 3-para; Dr. Neves, Lisbon; menorrhagia; perineum torn to sphincter; vagina dilated; uterus heavy; retroverted; much pelvic and abdominal pain. Curetted; perineum repaired; hysteropexy.

Case 39.—November, 1910: Mrs. S. N., aged 45; 2-para; extensive prolapse of uterus and vagina; perineum torn through sphincter; cervix deeply torn; pessaries little good; she is quite invalided; very stout. Shortened cervix; repaired sphincter and perineum; hysteropexy. 1913: Result perfect; no pessary; able to do everything.

Case 40.—March, 1911: Mrs. K., aged 45; 3-para; bad prolapse since first confinement ten years; pessaries little good. Perineum repaired; left ovary cystic, removed; hysteropexy. 1913: Results perfect, able to do anything.

Case 41.—Mrs. M. H., aged 47; chronic prolapse and retroversion; invalided; menorrhagia; much pelvic pain. Curetted; hysteropexy. February, 1913: Very well when not working hard. March, 1913: No prolapse; uterus in good position.

Case 42.—October, 1911: Mrs. E. T., aged 51; 6-para; perineum torn to sphincter; cystocele. Chronic labial abscess excised; perineum repaired; hysteropexy. January 21, 1913, letter from sister—Perfectly well and able to do anything.

Case 43.—November; 1911: Miss H., aged 38; Dr. Orr, Putney; chronic pelvic pain and backache for years, often severe; uterus enlarged and retroverted. Curetted; hysteropexy. March, 1913: Menstruation normal; no pelvic pain; health much improved.

Case 44.—April, 1912: Mrs. R., aged 39; Dr. Fisher, Fakenham; 1-para; chronic retroversion, pessary little good. Curetted; hysteropexy (round ligaments very thin and useless). January 17, 1913, letter from Dr. F.—Very well, no pain or trouble.

Case 45.—June, 1912: N., aged 44; Dr. H. M. Fletcher; 1-para; chronic retroversion and prolapse; cystocele; pessaries for years, little relief. Perineum repaired; hysteropexy. December: Uterus normal position; no cystocele; very well.

Case 46.—October, 1912: Mrs. H., aged 38; 3-para; menorrhagia; retroversion and prolapse six years. 1910: Curetted and repaired perineum, and pessary; some relief, but pelvic pain and menorrhagia returned. In 1912 curetted again; hysteropexy. January, 1913: Very well; no prolapse.

Case 47.—October, 1912: Mrs. D., aged 42: 1-para; Dr. Holden, Reading; ailing eighteen years since child-birth; intraligamentous cysts of both ovaries. Hysteropexy after removal of intraligamentous cysts; after operation large quantities of urine passed, with rapid disappearance of general œdema of body, and of the extensive pigmentation of skin.

Case 48.—November, 1912: Mrs. S., aged 44; Dr. Barrett, Folkestone; 9-para; perineum torn to sphincter; menorrhagia since eighth child, and prolapse; ring no good; vagina much dilated. Curetted; repaired perineum and hysteropexy. February, 1913: Menorrhagia continues.

Case 49.—November, 1912: S., aged 30; 2-para; retroversion; much pain; pessaries little relief. Gilliam's operation after excision of small cyst from left ovary and appendix which contained small hard fæcal masses.

Case 50.—January 20, 1913: Mrs. S., aged 35; prolapse since first confinement nine years; pessary not much relief; perineum torn to sphincter; uterus low and retroverted. Perineum repaired; cyst excised from left ovary; hysteropexy.

Case 51.—January, 1913: Mrs. G. B., aged 37; 1-para; Dr. Byan; seven years retroversion and much pain; heavy uterus, pessaries not much relief. Curetted; enucleation of two fibroids; hysteropexy.

Case 52.—February, 1913: Mrs. J., aged 42: 1-para; retroversion and prolapse of both vaginal walls since confinement nineteen years; pessary not much good; frequent incontinence of urine. Curetted; perineum repaired; small fibroids enucleated; hysteropexy.

Case 53.—February, 1913: Mrs. S. E., aged 38; 2-para; Dr. Arden Fegan. 1909: Double ovariotomy; retroversion and prolapse, not much relieved by pessary. 1913: Perineum repaired; hysteropexy.

The Technique of Ventral Fixation of the Uterus and Allied Operations.

By Henry Briggs, F.R.C.S.

The previous discussion of ventral fixation and its alternatives before this Section on December 6, 1905, was opened by Dr. Herman [11], who advocated, under approved conditions, a ventral fixation. In the meantime the confidence in the operation has been increased by advances in its selection, its methods and its results. There is now, in my judgment, ample evidence of a possible permanent rally of opponents, waverers and operators towards a simple, direct ventral fixation by peritoneum over a limited, and appropriately chosen, area. If any precision of this kind in the technique of ventral fixation is already within reasonable range, it cannot be received as the product of hazardous haste. It emanated early during fourteen years' experience from a series of 600 operations, and its enduring record is the testimony of all inquirers. Its purpose and efficacy as a simple and, I believe, acceptable, method of ventral fixation are realizable by a reference to its commonest application to the treatment of the backward displacement of the uterus. A backward displacement, with symptoms justifying an intraperitoneal operation, is frequently a retroflexion advanced from retroversion.

LOW-LEVEL FIXATION.

The flexion is cervical in site, consequently it can be corrected without attacking the body of the uterus at its higher levels, either indirectly through the round ligaments or directly by any form of ventral fixation. This observation is of paramount importance because, during the child-bearing period of life when the operation is at its best, it is desirable that at least 1 in., from the fundus downwards, of the body of the uterus shall remain absolutely free from any drag upon shortened ligaments and from any surgical fixation by band or otherwise.

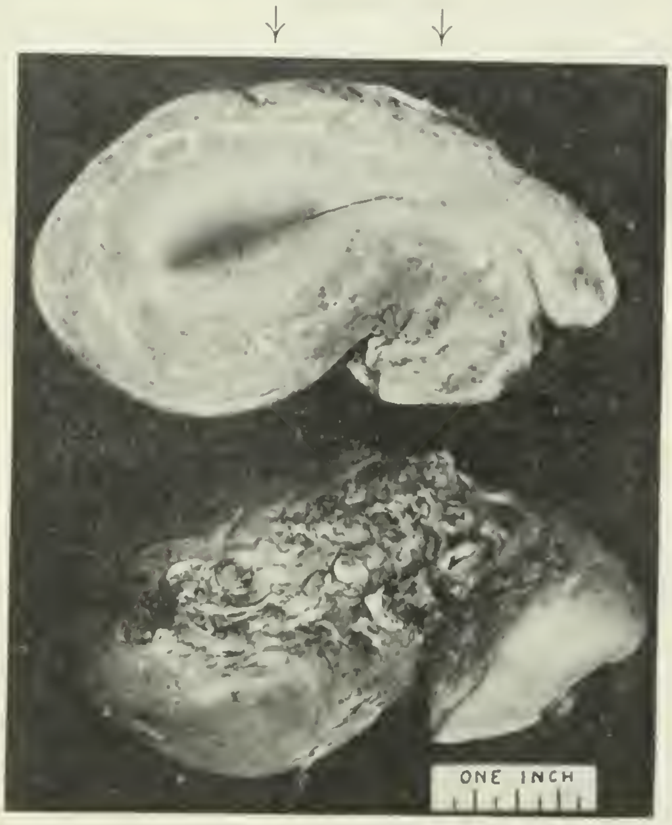


FIG. 1.

The retroflexion is cervical in site; the uterus (3½ in. × 2¼ in × 1¾ in.) is enlarged; the endometrium injected and thickened; glandular erosion of the cervix. (The arrows denote the site of the ventral fixation sutures.)

Mrs. W., aged 42; eleven and a half years married; three children; no abortions. History of irregular and profuse bleeding, pain in the back, leucorrhœa, and local irritation. Physical signs of an enlarged retroflexed uterus, partially prolapsed; left-sided tear in the cervix and corresponding cicatrix in the vagina; a weak pelvic floor; patient anæmic. Treatment: Vaginal hysterectomy and repair of the pelvic floor, November 13, 1911.

RETRO- V. ANTE-FIXATION.

Should the low-level uterine fixation be accomplished behind or in front of the uterus? This question was long ago finally answered and ante-fixation has since prevailed.

Retrofixation.—Vaginal and Abdominal.

Sanger [18] in 1891 ingeniously closed the pouch of Douglas *per vaginam*, and Freund [9], Bovee [3], Stanmore Bishop [2] and others shortened the utero-sacral ligaments to the danger and inconvenience of the rectum. Retrofixation, by either the vaginal or the abdominal route, is at least too inconvenient for acceptance.

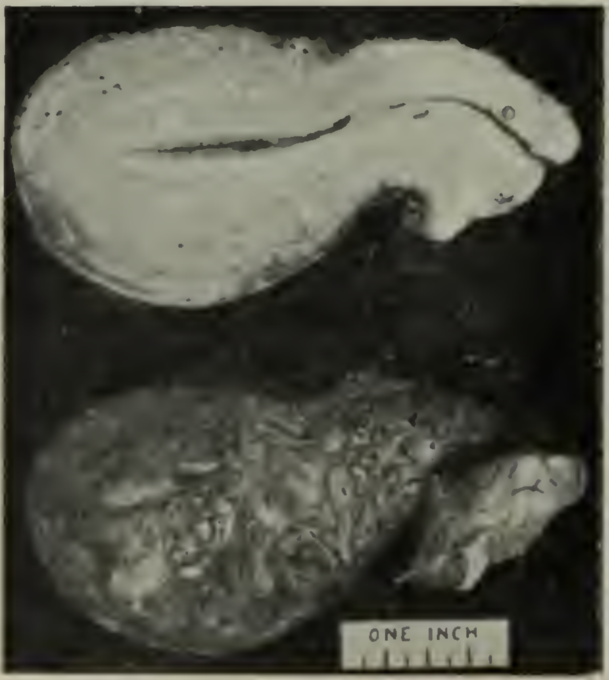


FIG. 2.

Retroflexion, cervical in site, from a patient aged 40; twenty years married; two children; three abortions in succession since the last child was born. Menses, 8/21 days. Symptoms: Menorrhagia and metrorrhagia; offensive leucorrhœal discharge; impaired health; sacral and hypogastric pain. Treatment: Vaginal hysterectomy, December 7, 1910. After-history: As a missionary she is resident in Persia, and writes complaining of "leucorrhœa" due to vaginitis, for which she is using a douche. (February, 1913.)

Ante-fixation.—Vaginal Fixation; Ventral Fixation.

Vaginal Fixation.—The efforts of Schücking [19], Klotz [12], Zweifel [25], Dührssen [6], Mackenrodt [14], and others collectively

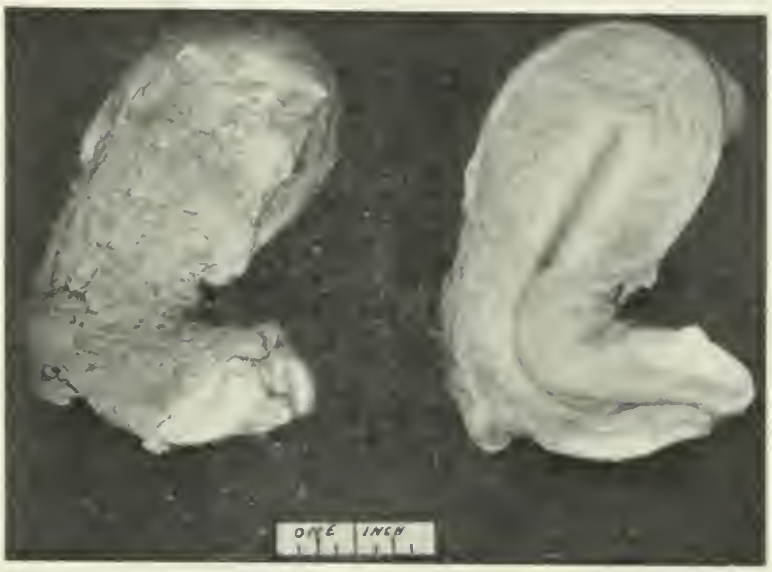


FIG. 3.

Anteflexion of long conical cervix. Menses, 2-3 23 days: clots; headache. Symptoms: Pelvic pain; expulsive pain; dysmenorrhœa in a neurotic single woman, aged 42. She was often confined to bed by the local suffering. Treatment (exceptional) by vaginal hysterectomy, March 13, 1912.

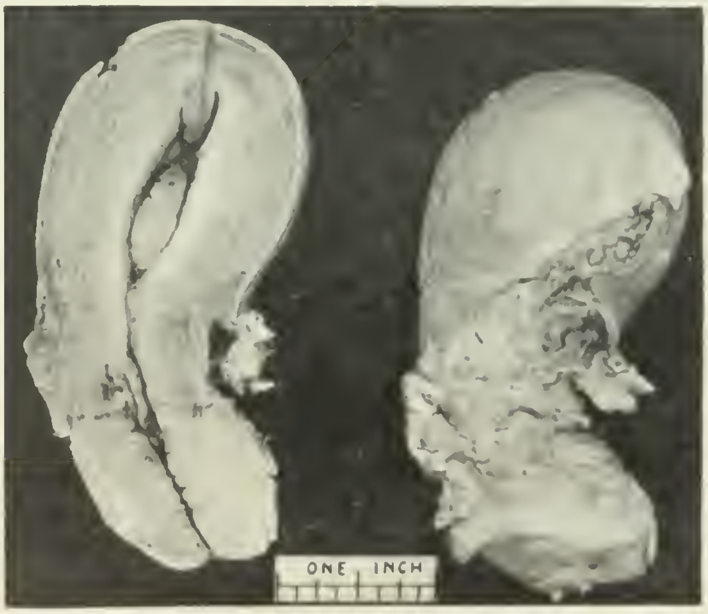


FIG. 4.

The uterus of a patient aged 40; sixteen years married; sterile. The body of the uterus contains two adenomatous polyps; the lower one could have been easily removed; the upper one, fundal and almost sessile, could have been removed with great difficulty and probably would have recurred. In the cervix there is a third, also adenomatous, polyp. Symptoms: Menorrhagia and metrorrhagia; dysmenorrhœa and clots. Treatment: Vaginal hysterectomy, May 17, 1911.

diverted the fixation from the limits and dangers of the vaginal to the facilities and safety of the abdominal route. Rarely and exceptionally the operator may still confessedly claim the contrary.

Ventral Fixation.—The abdominal route easily ensures every reasonable requirement of a low-level ventral fixation of the uterus. By it both the backward version and flexion of the uterus can be permanently corrected. Ante-flexion is almost uniformly a spontaneous sequence. The operation is performed as follows:—

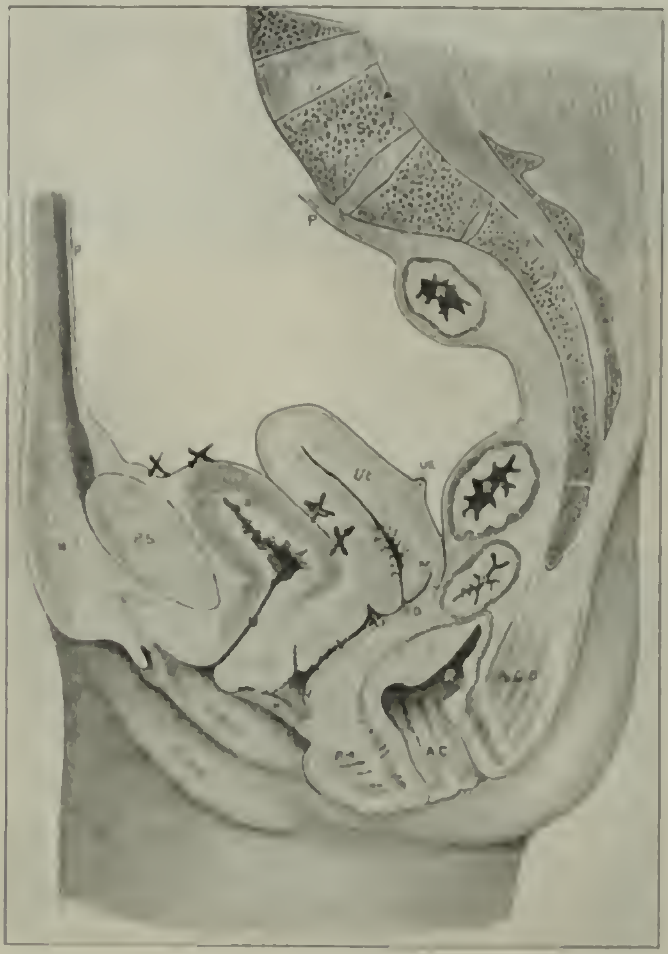


Fig. 5.

The forward elevation of ventral fixation. Pelvic viscera in woman, aged 30 (from Quain's "Anatomy"); all viscera depressed in level by mode of preparation. × ×, × × indicate ventral fixation areas of uterus and parietal peritoneum.

Abdominal incision: In the Trendelenburg posture, the central abdominal incision, of an average length of 2 in., should reach within 1 in. of the pubes, so that, when the parietal peritoneal edges are raised by forceps, the previously emptied bladder is recognizable with the more or less firm urachus and parietal peritoneum adjacent to the summit of the bladder. The parietal peritoneum required for coaptation with the uterus—i.e., the portion corresponding to the lower third of the incision, and the portion, if any, left undivided between the lower end of the incision and the bladder—is usually adequately loose and accessible without further prolongation of the more superficial abdominal incision; if not, the incision should be extended in the direction of the pubes.

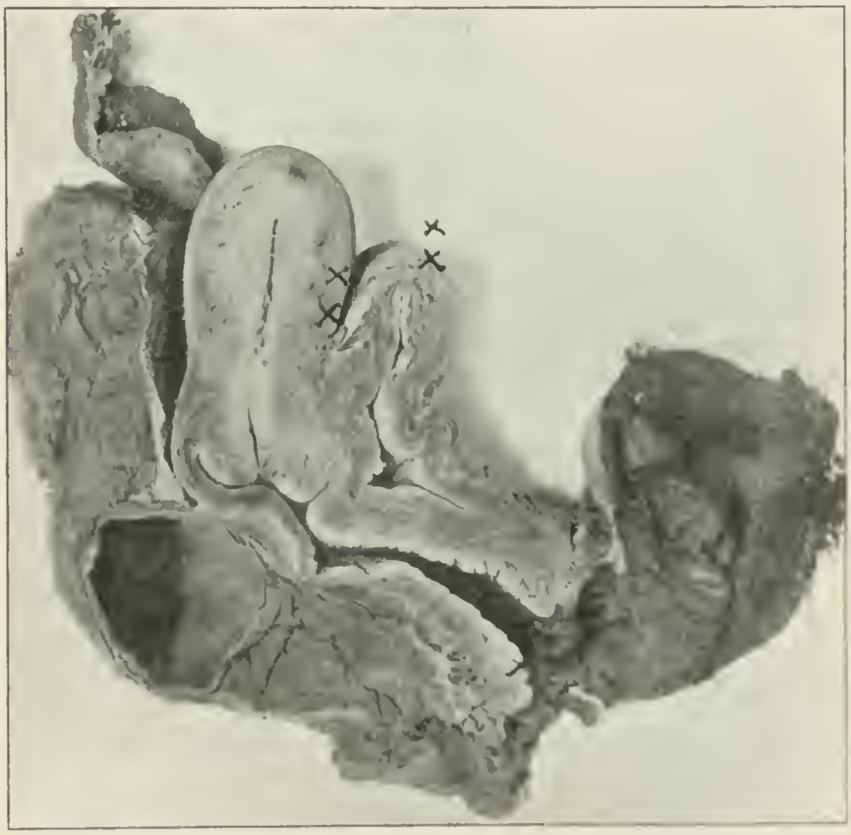


Fig. 6.

× ×, × × indicate ventral fixation areas.

The uterus, first raised by the fingers, is delicately gripped by a light volsella inserted into the centre of the fundus, and is steadied at the level of the abdominal incision by an assistant dragging very gently in the direction of the diaphragm. The coaptation between the lower half of the anterior surface of the body of the uterus and the portions of the parietal peritoneum specified is amply provided for, as a rule, by four loops of suture, each passed by a curved needle in a handle so as to gather and pucker the peritoneum and to penetrate the uterine wall to the depth of $\frac{1}{8}$ to $\frac{1}{4}$ in. The area of uterus thus sutured to parietal peritoneum should be ¾ to 1 in. in diameter and strictly limited to the anterior wall of the body of the uterus below its central convexity as far downwards as the base of the utero-vesical pouch. During the operation the lowest of the sutures is for safety passed first: this suture envelops the urachus and surrounding parietal peritoneum near the summit of the bladder and attaches them to the lowest portion of the body of the uterus in front. The sutures may be passed transversely, obliquely, or vertically to complete the coaptation without tension over the limited area of the uterus mentioned.

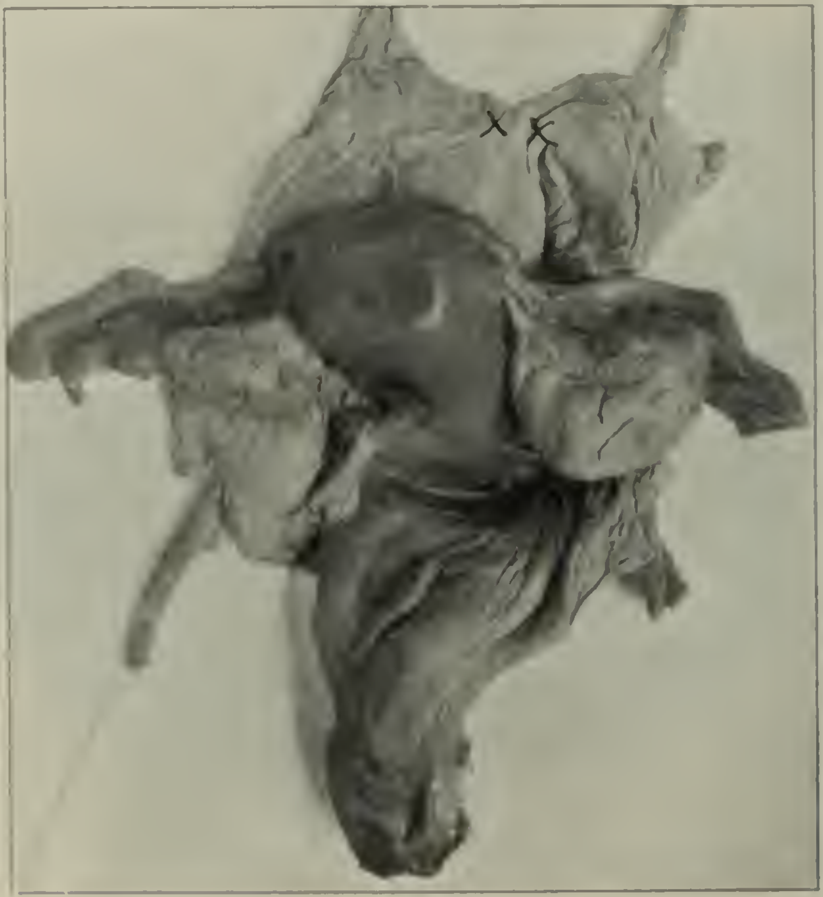


Fig. 7.

× × indicate parietal peritoneum at the summit of the bladder.

The anatomical result is a close anchorage of the lower half of the uterus by the recedent parietal peritoneum just above the summit of the bladder. Twisted silk, No. 00, is the material most reliable for ensuring the ventral fixation itself: it represents the only surviving use of silk in any gynæcological or obstetrical operation in my practice.

The closure of the abdominal wound is effected in independent superimposed layers: (*a*) peritoneum, (*b*) the anterior sheath of the rectus, and (*c*) the skin. No. 0 catgut for (*a*) and (*b*), No. 000 for (*c*). A separate continuous suture for each. The single continuous peritoneal suture (*a*) is not cut off or tied in the centre of the wound; its ends are brought through the exposed rectus muscle and its facial sheath ½ or ¾ in. on one or other side of the middle line, so as to lodge the sutured peritoneum behind the pillar of the rectus muscle for protection: the ends of this suture (*a*) when tied encourage overlapping of the recti muscles, whose firm sheaths are then secured by suture (*b*) across the middle line. Lastly, (*c*) the skin and superficial fascia are closed by one continuous length of catgut (1) starting from below upwards with coarse, deep and wide approximation suture loops through skin and fatty fascia, and (2) returning from above downwards with fine suture loops along the edges of the skin; finally the two ends of the catgut are tied where they meet at the lower end of the wound.

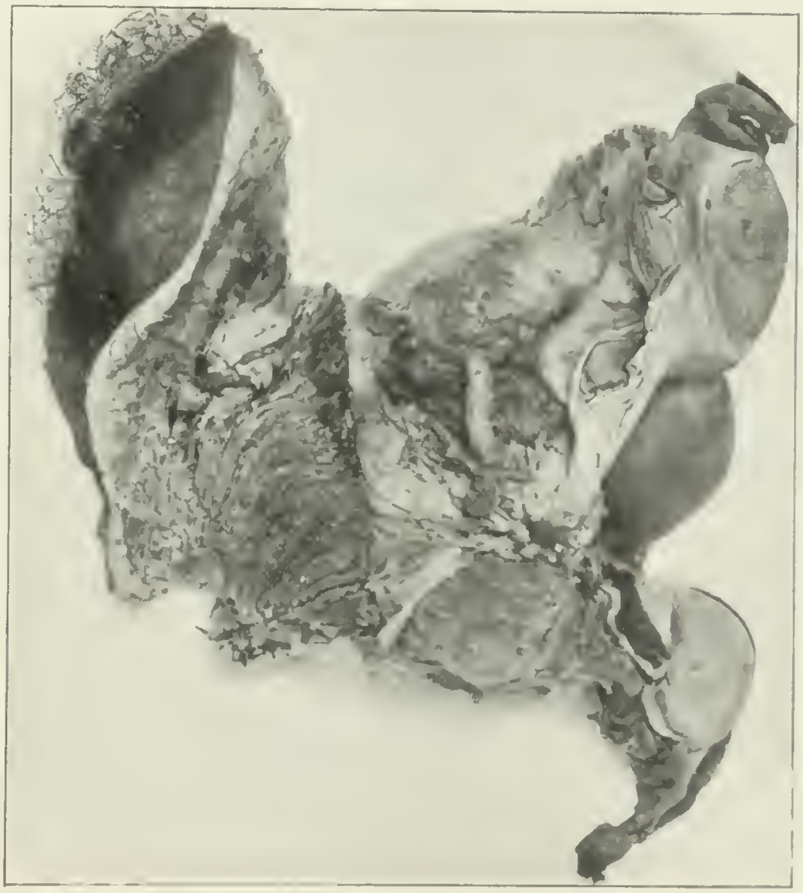


FIG. 8.

The paravaginal route for repair of the pelvic floor. Dissection of muscles and fasciæ of a portion of the pelvic floor.

Post-operative Progress.—After a rest for three weeks the patient usually leaves her bed without restriction. An abdominal belt may be worn, for three to six months, if desired for any physical reason. Incisional hernia has been absent throughout my own series.

The Mortality.—Three deaths in 600 cases: (1) From pulmonary embolism fourteen days after repair of the pelvic floor; a bilateral appendage removal and a ventral fixation. (2) Sudden heart failure five and a half days after a normal post-operative progress following perineorrhaphy, dilatation and curettage and a ventral fixation. (3) Post-operative peritonitis: the abdomen was re-opened on the twelfth day; there was no lymph on the peritoneum and no implication of bowel in the ventral fixation suture; the ventral fixation was done for a retroflexion with prolapse of both ovaries. In my opinion the death on the twelfth day was due to sepsis; there was no fever: intestinal obstruction was the only clinical evidence.

The *after-histories* of the 597 survivors have been systematically obtained and recorded from my first ventral fixation in February, 1899, onwards. At first the inquiries were frequently repeated; the anxieties were then greater than they are now. I now believe in the operation of ventral fixation.

In 1906, when I was drawing up the table of the first 205 cases [4], Dr. F. W. Inman visited many of the patients, some of whom he found at work—e.g., carrying buckets of coal. Any one who knows Dr. Inman will share with me an enhanced respect for his reports.

THE EFFICACY OF PERITONEAL VENTRAL FIXATION.

Dr. Inman's spontaneous and independent testimony of the physical activity of the women after operation in my own series was most encouraging. The present estimate is that in 98 per cent. of the cases the ventral fixation permanently rectifies the retroflexion. I agree with Küstner [13] "mobility with fixation is desirable," and, whether desired or not, mobility develops as a rule. Adhesions are stronger after non-absorbable than after absorbable sutures and, even if initially ample for fixation, like constitutions, their usual subsequent tendency is to relax, lapse, or vanish in response to natural or acquired agencies. A low-level peritoneal ventral fixation by silk suture primarily converts a retroversion or retroflexion into an anteversion or anteflexion with the obvious future advantages conferred by its location: (1) A minimum of strain on its own products; (2) rest and recuperation for the already weakened natural supports of the uterus; (3) accurate anatomical adjustments for post-operative pregnancy and labour. Without excess of enthusiasm, advocacy may further rely on post-operative reports.

Obstetric Histories.—Dr. Russell Andrews [1] in 1905, in his digest of all previous cases in reference to this point, states that the method of fixation involving least difficulty in labour is that in which the uterus is attached only to the parietal peritoneum, or peritoneum and subperitoneal connective tissues. The reports from my own series support the statement. In a large number of cases of subsequent pregnancy natural labour has been the rule and easy forceps delivery the exception; without one single instance of dystocia. In one patient, Dr. Masson, of St. Helens, reported slight uterine inertia during the third stage in each of the four deliveries (twins once) since the operation and not observed before operation.

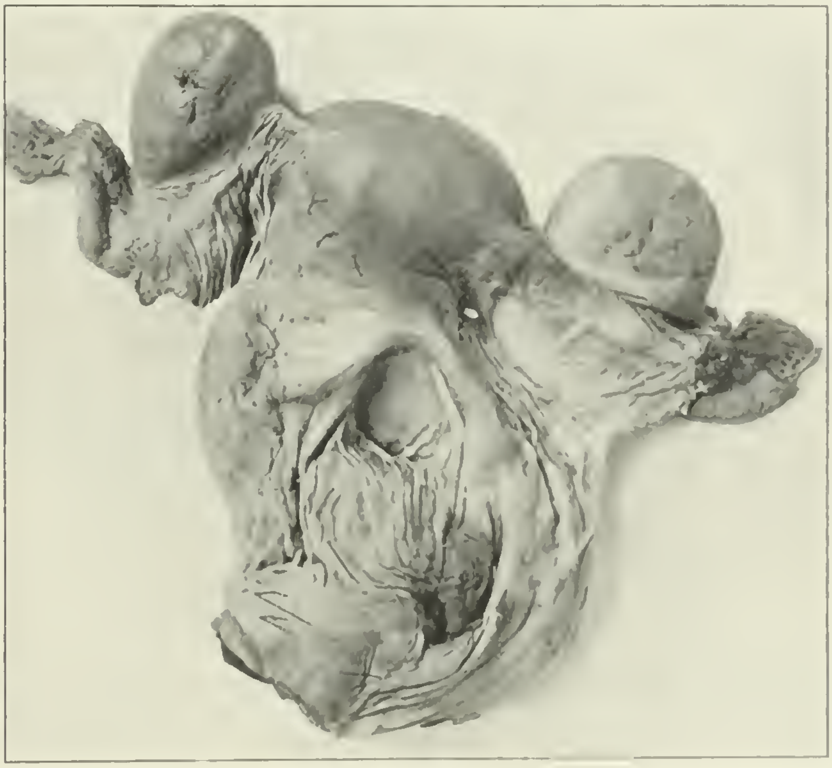


FIG. 9.

To show the deep dissection behind the vagina required for the support of the pouch of Douglas. Utero-sacral ligaments; pouch of Douglas widely open.

RECURRENCE OF THE BACKWARD DISPLACEMENT.

This is to be expected and is unavoidable. Its rarity is remarkable even after repetitions of post-operative labour at the full term. In the few cases of recurrence attributable to labour I have, when justified, repeated the ventral fixation with, if required, the repair of the pelvic floor. In the few cases of recurrence not attributable to labour, errors of selection or of technique (e.g., the earlier use of catgut instead of silk sutures) have been traceable and amended at the second operation.

The Bladder.—The upward extension of the space of Retzius by the recedence of the loose parietal peritoneum from the abdominal wall provides for bladder accommodation which a fascial or muscular fixation tends to hamper. During a ventral fixation, suture of the bladder peritoneum of the utero-vesical pouch is unnecessary and may incur the later risk of irritation or accidental infection, especially if silk, whether boiled or not, be the suture material.

THE DANGER AND OTHER ATTRIBUTES OF INTRAPERITONEAL BANDS.

The site of the band of a low-level peritoneal ventral fixation underneath the uterus is consistent with the safety revealed in the after-histories of 597 cases free from intestinal strangulation.

THE ROUND LIGAMENT OPERATIONS.

Are the round ligament operations really founded on anatomical fact or fantasy? During the limits of this short introduction of them into a discussion on the technique of ventral fixation and allied operations, I hesitate to ask the pertinent question. The tests of time and of practical utility have already, rightly or wrongly, disposed of the multitude of them. Gilliam's operation is the only widely adopted and enduring exception. The round ligament technique, always prolific, is still restless and progressive: so recently as February 1, 1913, Professor Max Stolz [22] is claiming from Dr. Langes the priority of performance of a new method of tripartite shortening of the round ligaments published this year. The impress of Alexander's ingenuity in 1881 still survives notwithstanding the long-restricted sphere of his original extraperitoneal operation. The addition thereto of a posterior vaginal section, when required for the treatment of adhesions and diseased appendages, by its incompleteness and other disadvantages, still further substantiated a change to abdominal section. The intraperitoneal round ligaments, like main lines, have attracted and concentrated surgical efforts, like traffic, through endless junctions and loops.

The methods of Wylie [24], Dudley [5], and Polk [17], are already obsolete. Attempts by Fergusson [8], Simpson [20], Noble [16] and Mann [15], to make use of the stronger uterine half of each of the round ligaments have not appreciably appealed to operators. A similar reception has been given to Webster's operation [23], in which the looped uterine portion of each of the round ligaments is dragged through the mesometrium and closely sutured behind the uterus. Gilliam [10] opens the abdomen and drags each round ligament through its corresponding rectus and sheath by an additional obliquely punctured wound made by forceps. He sutures the ligaments externally to the firm tendinous abdominal wall. This is not a purely intraperitoneal round ligament operation: its advantages abundantly account for its present premier position amongst round ligament operations.

THE CHOICE OF OPERATION.

Direct v. Indirect (Ligamentary Fixation).

Direct Ventral Fixation.—Combat in any shape on the accepted synonyms—ventral fixation, ventro-suspension, hysteropexy and hysterorrhaphy—is not included under the technique of ventral fixation. To remain effective any ventral fixation must be accompanied by a pelvic floor of the adequate strength, or by its simultaneous complete restoration from defect or damage. Operative gynæcology may profit by the parallel progress towards precision in pessary treatment from the older waist-slung cup and stem pessary to the more modern perineum-borne pessary of Albert Smith. Direct ventral fixation, in this light, has not shown any lack of rambling and deliberate technical skill: (1) at inconvenient and unnecessary heights it has courted discomfort from awkwardly distributed stress and strain on its attachments; (2) at varying depths it has burrowed into the fascia and muscle of the abdominal wall below the umbilicus. Almost every available portion of the uterus has been similarly selected for attack; even the posterior wall of the uterus has not escaped the ventro-suspension sutures of Howard Kelly since his pioneer operation in 1886; his exceptional skill and resource have incurred but few of the most feared risks; Nature must have freely intervened on behalf of post-operative pregnancy when it occurred, and finally escaped dystocia. Kelly seceded from fixation to suspension and his testimony against fascial and muscular fixation is of a controlling character. Fundal fixations by Fritsch, Czerny, Leopold, Mundé, Noble and others are only permissible after the climacteric. Laroyenne and Sinclair [21] effectively protested against the fundal fixation: each included the fascia of the abdominal wall in a ventral fixation of the lower portion of the body of the uterus.

Indirect Ventral Fixation (ligamentary).—Gilliam's operation runs off the anatomical round ligament line and comes nearer than any other round ligament operation to the middle line. Its lateral indirect fixation nearly approaches the median direct fixation; another ½ in. of either would make the two fixations continuous—i.e., if in the same patient. Gilliam's is nearly fundal, practically fundal: the direct fixation is corporeal at a low level. The former tends to relax and not to raise, the latter slightly to tighten and to raise, the pelvic floor. In the event of subsequent pregnancy and labour Gilliam's operation speculates on spontaneous adjustment and readjustment of the round ligaments: ideals at least equally open after direct fixation.

My own attitude in this discussion will, I trust, be made more intelligible by the frank confession that during my earlier professional years the opposition to ventral fixation was deeply rooted: (1) by the teachings of the authorities I most revered, and (2) by having myself seen in 1884 the long and slender, atrophied vestige of a broad ligament eighteen years after the extraperitoneal treatment of the pedicle in ovariotomy. The earliest ventrofixations, in 1886, two years later, by Olshausen and Kelly, did not appeal to me. My tardy conversion came later. After twelve years' experience of Alexander's operation and of vaginal fixation in a limited number of cases, I had abandoned both operations.

In February, 1899, as a compromise after the separation of pelvic adhesions around an adherent left Fallopian tube, the tube not requiring in my opinion removal, I carried out my first ventral fixation for a retroflexion of the uterus in a 2-para, aged 34. On December 7, 1906, her uterus was in good position; there was occasionally slight pelvic pain on the left side at the site of the original salpingitis.

On January 17, 1907, I submitted to the Liverpool Medical Institution the detailed tables, including the after-histories of 205 cases of backward displacement of the uterus in which ventral fixation had been performed by me as a part, or the whole, of the operative treatment.

At the close of 1912, 395 additional and similar cases of ventral fixation had been registered in my hospital and private practice. Of the total 600, approximately 25 per cent. of the cases were treated by ventral fixation alone. The tendency has been to lessen this percentage on increased clinical scrutiny in the directions now to be indicated.

The Pelvic Floor and Uterine Prolapse.—Ventral fixation has accentuated the enormous value of Berry Hart's original researches on the pelvic floor as a whole. Prolapse is seldom totally absent from a backward displacement. A pelvic floor adequate for the comfort of an Albert Smith or a ring pessary may be inadequate for an effective ventral fixation. A ventral fixation for procidentia uteri may be extravagantly or too deliberately carried out or absurdly tested by suspending or hanging the uterus over a permanently weak pelvic floor. This reference to the major degree of prolapse stamps the object-lesson—to repair the pelvic floor earlier during the child-bearing period of life before it becomes an atrophied wreck beyond restoration.

An adequate pelvic floor, as a platform of support, is the primary security for any reasonable ventrifixation, just as a similar state of the abdominal wall is after the most perfect herniotomy.

Operation.—Complete repair of the pelvic floor, in both segments, implies a deep dissection from below, through, or under, the vaginal wall by incisions preferably in the lines of, or at the sites of, old cicatrices; the accurate apposition of the deep fasciæ and muscles raises (*a*) the bladder in the anterior segment; and (*b*) the pouch of Douglas, without opening into it, in the posterior segment. Buried catgut sutures unite the deep tissues, they are followed by the superficial, coarse and fine, adjustment by catgut sutures without the sacrifice of any vaginal wall.

THE COMPLICATIONS OF BACKWARD DISPLACEMENT OF THE UTERUS.

Dr. Eden [7], quite logically, classified as (1) consecutive, and (2) independent, the most frequent complications of backward displacement of the uterus. As consecutive complications, the thickened endometrium may require curettage or the prolapsed ovaries the shortening of the true ovarian ligaments. The independent complications may be unrecognized clinically—peritoneal bands, mild salpingitis, slight oöphoritis, tiny or small new growths; on their character and treatment much of the ultimate success of ventral fixation depends.

Pelvic peritoneal inflammatory products generally add uncertainty to the prognosis; germ infection in, or around, the uterus may be active, latent, or spent.

The technique of ventral fixation needs a fine adjustment to the pelvic requirements—often too fine an adjustment in operative gynæcology; one or more of the requirements may lack fulfilment or even contra-indications may escape observation both before and after the abdomen is opened. A successful technique is to be further explained by (*a*) the favourable low-level site which places the minimum of drag on the peritoneal adhesions or bands; (*b*) the consecutive spontaneous readjustment of the weakened natural supports of the uterus which have been artificially relieved from strain.

On the available evidence and with the reservations I have mentioned, *the objections to peritoneal ventral fixation* are left with little more than a shadow of foundation on its failures. It is not purely a question of the strength of materials, but rather one of easy local apposition which is apparently permanent, even if the products of the ventral fixation itself have only a temporary survival.

REFERENCES.

[1] Andrews, Russell. *Journ. of Obst. and Gyn. Brit. Emp.*, 1905, viii, pp. 97-125.

[2] Bishop, Stanmore. *Brit. Gyn. Journ.*, 1902-03, xviii, pp. 313-42; 1903-04, xix, pp. 50, 56.

[3] Bovee. *Amer. Gyn.*, New York, 1902, i, pp. 35-44.

[4] Briggs, Henry. (Proceedings of the Liverpool Medical Institution, 1907), *Med. Press and Circ.*, 1907, cxxiv, p. 116.

[5] Dudley. *Amer. Journ. Obst.*, New York, 1890, xxiii, pp. 1336-51.

[6] Duhrssen. *Zeitschr. f. Geb. u. Gyn.*, Stuttg., 1892, xxiv, p. 368.

[7] Eden. *Practitioner*, 1904, lxxii, pp. 707-17.

[8] Fergusson. Webster, "Diseases of Women," 1907.

[9] Freund. *Verhandl. d. deutsch. Gesellsch. f. Gyn.*, III Kongr. Freiburg (1889). 1890, p. 153.

[10] Gilliam. *Journ. Amer. Med. Assoc.*, Chicago, 1901, xxxvi, p. 1692.

[11] Hermann. *Journ. of Obst. and Gyn. Brit. Emp.*, 1906, ix, pp. 3-12.

[12] Klotz. *Zentralbl. f. Gyn.*, Leipz., 1891, xv, p. 97.

[13] Kustner. Veit's "Handbuch der Gynäkologie," Wiesb., 1907, i, p. 234.

[14] Mackenrodt. *Zeitschr. f. Geb. u. Gyn.*, 1892, xxiv, p. 315; and 1895, xxxiii, p. 514.

[15] Mann. Kelly and Noble, "Gynecology and Abdominal Surgery," 1907, i.

[16] Noble. Kelly and Noble, "Gynecology and Abdominal Surgery," 1907, i.

[17] Polk. *Trans. Amer. Gyn. Soc.*, Philad., 1889, xiv, pp. 250-69.

[18] Sanger. "Über Retrofixatio Colli Uteri Retroflexi," *Zentralbl. f. Gyn.*, Leipz., 1892, xvi, p. 1.

[19] Shucking. *Zentralbl. f. Gyn.*, Leipz., 1888, xii, p. 682.

[20] Simpson. Kelly and Noble, "Gynecology and Abdominal Surgery," 1907, i.

[21] Sinclair. *Lancet*, 1908, ii, p. 1004.

[22] Stolz, Max. *Zentralbl. f. Gyn.*, Leipz., 1913, xxxvii, p. 169.

[23] Webster. "Diseases of Women," 1907, p. 487.

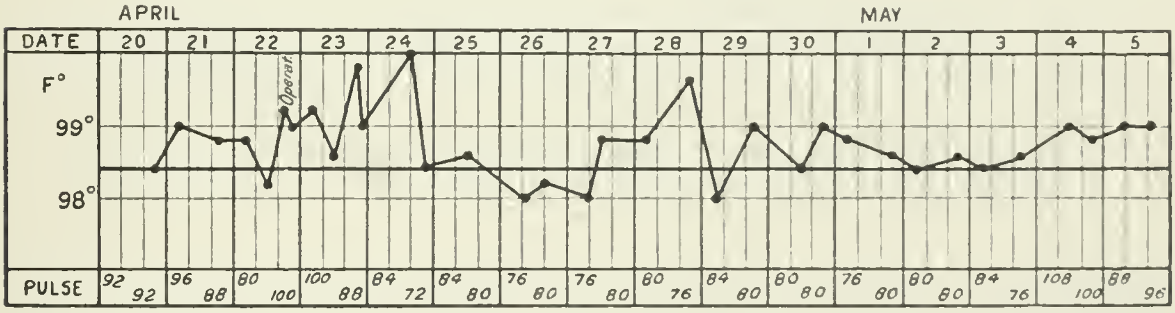
[24] Wylie. *Amer. Journ. Obst.* 1889, xxii, pp. 478-485.

[25] Zweifel. *Zentralbl. f. Gyn.*, Leipz., 1890, xiv, p. 689.

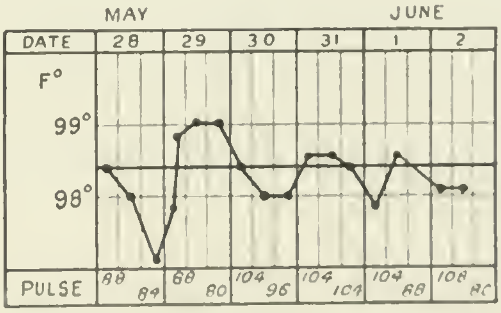
APPENDIX.

SHORT DETAILS OF THREE FATAL CASES. (*See* MORTALITY.)

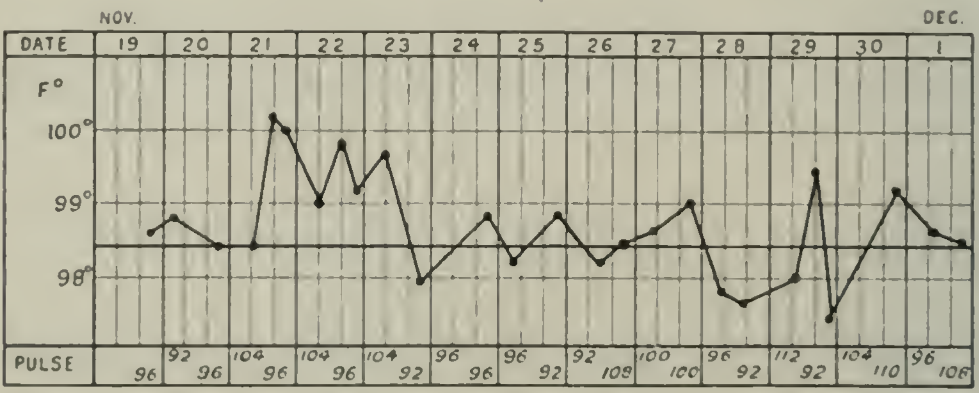
(1) *Retroversion: Bilateral Salpingo-oöphoritis.*—J. C., aged 37; eleven years married; three children, none living; an abortion five months ago, induced at the ninth week by her own doctor for excessive vomiting. An attack of pelvic peritonitis followed the abortion. She was admitted to hospital with bilateral appendage fixation and swelling and a fixed retroverted uterus. On April 22, 1908, the pelvic floor was repaired, the uterine appendages were removed, and the uterus was ventrofixed. On May 6, 1908, she died suddenly from pulmonary embolism after an almost normal convalescence and with a healed abdominal wound. The source of the pulmonary embolus was not found in any of the pelvic veins.



(2) *Retroversion: Prolapse of Left Ovary.*—E. P., aged 27; six years married; two children, the younger aged 3½. Sacral and left-sided pelvic pain, dysmenorrhœa, menorrhagia, leucorrhœa, and irritable bladder. A tender retroverted uterus and prolapsed ovary. The patient was anæmic. On May 28, 1909, the perineum was repaired, the cervix dilated, and the uterus curetted; ventral fixation. On June 2, after a normal pulse and temperature, without the least warning she suddenly died of heart failure.



(3) *Retroversion.*—W. P., aged 25; nine months married. Menses, 4/28 days. History of six years' dysmenorrhœa, six months' dyspareunia, sacral pain, menorrhagia, and leucorrhœa. Operation: Dilatation of the cervix and ventral fixation (November 20, 1912). Post-operative peritonitis: the abdomen was re-opened on the twelth day; there was no lymph on the peritoneum and no implication of bowel in the ventral fixation suture: the ventral fixation was done for a retroflexion with prolapse of both ovaries. In my opinion the death on the twelfth day was due to sepsis; there was no fever; intestinal obstruction was the only clinical evidence.



The After-results of Operations for Uterine Displacements.

By Arthur E. Giles, M.D.

In discussing the after-results of these operations, it is above all things necessary to specify what operations are referred to, because there is no standard operation for displacements. If the results of ovariotomy or hysterectomy were under consideration, it would be different. The particular organ having been removed, it matters very little how it was removed. But with displacements the results depend entirely on the kind of operation that is done.

A second important point is that a group of cases should consist exclusively of those in which the same operation has been done. Deductions from the after-results of a mixed group, such as vaginal fixations, Alexander's operation and ventrifixation, would have no value; and even if the mixed group consisted entirely of intra-abdominal operations such as ventrifixation, ventrosuspension, and Gilliam's operation, the data would be worthless: for the various tethering procedures allow of different degrees of mobility and varying capacity for enlargement.

In the following remarks I speak of the after-results of a specific abdominal operation—namely, hysteropexy. It is neither a ventrifixation nor a ventrosuspension, in the restricted sense in which these terms are used. As much confusion still prevails on the subject of these operations, it may be as well to restate their distinguishing features. By ventrifixation is understood an operation in which the uterus is made to assume a position of extreme anteflexion, and the sutures are passed through its posterior surface and firmly fixed to the fascia of the abdominal wall. A normal pregnancy after such an operation is practically out of the question. By ventrosuspension, on the other hand, is meant an operation in which the sutures are passed through the anterior wall of the uterus, and tied to the peritoneum, and not to the fascia. By this means pregnancy can develop undisturbed, but the ease with which the peritoneum stretches predisposes to a return of the displacement. Ventrifixation is quite obsolete, and ventrosuspension is rarely done, and it would be well therefore for the terms to be dropped altogether. I have abandoned them myself and use the word "hysteropexy" for the operation that I have nearly always adopted. The features of this operation are that the sutures are passed through the anterior wall of the uterus, as low down as possible, leaving the fundus free to expand in the event of subsequent pregnancy; and the sutures are passed on each side of the incision through the fascia as well as the peritoneum, to minimize the risk of a return of the displacement.

I have recorded the after-results of hysteropexy on previous occasions: In 1906[1] when I had the after-histories of 73 cases; in 1908[2] when I reported 136 cases; and in 1910[3] when I had traced 248 cases out of 309 operated upon up to July, 1909. When I was asked to introduce this discussion I decided to try to bring my cases up to date, as far as the limited time at my disposal allowed. In the three years from July, 1909, to July, 1912, I had 199 hysteropexies, bringing the total operations to 508; and I have been able to obtain the after-histories of

---

[1] "A Study of One Hundred and Forty-six Consecutive Cases of Ventrifixation of the Uterus," *Brit. Med. Journ.*, 1906, ii, p. 1188.

[2] "The After-results of the Surgical Treatment of Uterine Displacements," *Med. Press and Circ.*, 1908, cxxxvi, p. 518.

[3] "After-results of Abdominal Operations, based on 1,000 Consecutive Cases," Baillière, Tindall and Cox, 1910.

125, bringing the total of cases traced to 373. The 199 cases fall into three groups, according to the indication for the operation:—

(*a*) For retroversion, 92 cases, of which 66 were traced.

(*b*) For prolapse, 40 cases, of which 39 were traced.

(*c*) For procidentia, 67 cases, of which 30 were traced.

It would be a great advantage if operators who have had a large experience of other procedures, such as vaginal fixation, Alexander's and Gilliam's operations, could report the results, so as to afford data for comparing the relative advantages of different operations.

I proceed now to record the results in my cases of hysteropexy, and it will be convenient to do so in the form of replies to the following questions:—

(1) How is the general health of patients who have had the operation?

(2) How is the bladder affected?

(3) How do patients get on who have become pregnant?

(4) Does pregnancy undo the good results of the operation?

(5) In what proportion of cases is the displacement permanently cured?

(1) How is the General Health of Patients who have had the Operation?

I have data in 120 cases. One patient died of phthisis a few months after the operation; one had to have a hysterectomy done for a large sloughing fibroid; a third developed a large ovarian cyst and underwent ovariotomy; a fourth had a recurrence of prolapse and was operated on again. Of the remaining 116, 79, or 68 per cent., were in very good health and felt better than before the operation; 13, or 11·2 per cent., had moderate health, but felt better than before; 13, or 11·2 per cent., had poor general health, but felt better locally; 6, or 5 per cent., were in poor health and did not feel better or felt worse; and 5, or 4·4 per cent., had had either poor health or local discomfort lately. Comparing the results in the three groups of cases we get the following tabular statement (p. 195).

Thus we find that in about 80 per cent. of cases patients were better generally as well as locally. In a further 10 per cent. they felt better locally, but the general health was poor on account of such conditions as gout, gastritis, rheumatism, indigestion, faintings, nervousness, or weakness. In other words, there was improvement in health in 90 per cent. of cases. In my previously recorded cases the proportion showing improvement was exactly the same, 90 per cent.

	(*a*) For retroversion		(*b*) For prolapse		(*c*) For procidentia		Total	
	Number	Per cent.	Number	Per cent.	Number	Per cent.	Number	Per cent.
Very good ; better ...	43	70·5	19	65·6	17	65·4	79	68·1
Moderate ; better ...	7	11·4	3	10·3	3	11·5	13	11·2
General health poor ; better locally	8	13·1	3	10·3	2	7·7	13	11·2
Poor ; not better ...	3	5·0	2	6·9	1	3·9	6	5·1
Ill-health lately ...		—	2	6·9	3	11·5	5	4·4
Total	61	100·0	29	100·0	26	100·0	116	100·0

Statistics are, of course, dull and lacking in inspiration, and it is difficult to give a correct idea by means of figures of the great benefit that the great majority of patients have obtained by the surgical treatment of their displacements. Many of them in writing to me have expressed in the most emphatic terms the improvement which has resulted from the operation. It is true that if I gave quotations they would smack a little of an advertisement of a patent medicine. But, if space allowed, I would quote the words of the patients themselves in order that I might in some measure meet the charge of unconscious bias that was made against me by a not unfriendly reviewer who wrote concerning my work : " Such an investigation when carried out by the operator himself is, of course, always open to the grave objection that he is by no means the best judge of the after-condition of his patients. The personal equation must enter into an inquiry of this kind and the tendency to exaggerate the benefits gained, and to minimize the bad effects resulting, from any operative procedure must be so powerful as inevitably to vitiate to some extent the conclusions formed even by the most impartial of observers. For this reason we are inclined to lay much greater stress upon the after-histories of patients when they are recorded by some observer other than the surgeon himself." [1]

---

[1] "A Study of the After-results of Abdominal Operations on the Pelvic Organs," &c. (Review), *Lancet*, 1911, ii, p. 310.

(2) HOW IS THE BLADDER AFFECTED?

Many visitors to the operating theatre, when watching a hysteropexy, have asked what happens to the bladder, and whether there is much disturbance in the form of frequency of micturition. The question is a natural one, because it is clear that the bladder cannot distend in the usual fashion. I have had the opportunity of examining patients, who have had a hysteropexy, when the bladder was full, and found that the bladder obtained extra room partly by expanding laterally and partly by pushing the cervix back. Normally, when the bladder fills, the upper pole of the uterus is tilted back, turning on a tranverse axis in the position of the cervix: after a hysteropexy the lower pole of the uterus is tilted back, turning on a transverse axis near the fundus.

There is disturbance in the form of frequent micturition in some cases, but in much fewer than one might expect. I have inquired rather minutely into this question, and have data in 86 cases. I have divided the cases into two groups, the one comprising cases operated upon for retroversion, and the other cases operated upon for prolapse and procidentia; and in each group I have set down the results in four categories stated in tabular form as follows:—

	For retroversion		For prolapse and procidentia		For total	
	Number	Per cent.	Number	Per cent.	Number	Per cent.
No frequency of micturition	29	61·6	20	51·2	49	57·0
Some frequency: less than before ..	6	12·8	7	18·0	13	15·1
Frequency about the same as before ...	6	12·8	5	12·8	11	12·8
Frequency more than before .	6	12·8	7	18·0	13	15·1
Total	17	100·0	39	100·0	86	100·0

This table shows that, taking all the cases together, 73 out of 86, or 85 per cent., had either no trouble, or at least not more than before operation; whilst the remaining 13, or 15 per cent., were worse off in this respect than they were before. As a set-off to these there were cases in which the operation was followed by improvement. In addition to the 13 cases in which there was diminished, though still definite, frequency, there were several cases in the first category that had no frequency after the operation, but were troubled with it before.

It is a matter of some interest that there were fewer cases of trouble when the operation was done for retroversion than when it was done for prolapse or procidentia, and I think that there are two reasons for the difference. In the first place, prolapse and procidentia are generally associated with cystocele, and it was necessary, in a large number of these cases, to do an anterior colporrhaphy, which might have a contributory effect in causing frequency of micturition. In the second place there is the age factor. It is well known that many women, as they get older, have some tendency to frequency of micturition; and that this factor may play a part in these cases is shown by the rather striking difference in the average age of the patients, which was 35 in the cases of retroversion, and 43 in the cases of prolapse and procidentia.

(3) How do Patients get on who have become Pregnant after a Hysteropexy?

Of the 125 cases under review, 18 were single women, 3 were widows, 30 were married women over 40, and 74 were married women under 40—i.e., of the child-bearing age. Of the latter, 12 became pregnant, or 1 in 6. In my previously recorded cases, 48 became pregnant out of 144, or 1 in 3; but in many of them a much longer time had elapsed between the operation and the date of the after-history notes. Of the 12 cases, 8 have been confined, and 4 are pregnant at the time of writing, respectively two and a half, three, four and a half, and nine months; the confinement of the last is about due. I have, further, the histories of 10 confinements not previously recorded, among the patients whose after-histories were included in my last report. The particulars of the 18 confinements are as follows, commencing with the 10 cases last mentioned. The reference letters correspond with those in the original tables.

Ta 48.—Operation, November, 1906; patient married in February, 1911; normal confinement of a boy, November 17, 1911. Attended by Dr. R. Adamson Fido.

Ta 68.—Patient had already had one natural confinement following operation. A second confinement, of a girl, on January 20, 1911; labour was natural, rather slow because the waters broke early; no forceps used.

Ta 75.—This patient also had already had one natural confinement after the operation. Dr. J. E. B. Wells wrote on May 25, 1912: "Mrs. G. had another child on the 8th inst., the second since the operation. She had quite a normal confinement, though she complained a good deal of pain whilst she was carrying; the membranes ruptured some time before regular pain set in—about thirty hours before labour terminated. The child was well developed, weighing over 8 lb."

Ta 84.—Operation in April, 1909; normal confinement of a girl on March 25, 1911. Attended by Dr. A. R. Wainwright.

Tc.—Mrs. S.: Operation in May, 1907. I did not see her till October, 1910, so her notes did not appear in the earlier records. She had then had two confinements and was pregnant again, seven and a half months. The two confinements were as follows;—

(1) June 19, 1908: Natural confinement of a girl, born before the arrival of the doctor. Attended by Dr. Dixon.

(2) September 5, 1909: Confinement of a boy; the labour was natural, but "the afterbirth came away with difficulty." Attended by Dr. Dixon.

(3) The third confinement, a month after I saw her, was on November 25, 1910, and took place in Queen Charlotte's Hospital. Dr. E. Marshall Cowell, Resident Medical Officer, kindly wrote to me, as follows: "She had no undue difficulty with her labour (the seventh), which was the third since the operation. First stage lasted fourteen hours; second stage five and a half hours. The cervix had to be pushed up over the head. She was left so long because of uterine inertia. For three hours she had no further pains at all. Small baby, probably about three weeks premature. . . . She was not torn at all in this delivery. . . ."

Td 28.—Dr. Howard Downes wrote to me on March 19, 1911: "Mrs. M., on whom you performed a hysteropexy on June 21, 1909, was safely delivered of a male child yesterday week (March 11). She had an uneventful pregnancy and a rapid labour, so rapid that I was not sent for until after the baby was born. I found a rather severe tear in the repaired perineum, in which I put two stitches and hope it will close all right. The perineum was very hard and fibrous, and I doubt whether I could have prevented some tearing had I been there. The baby was a big one, about 9 lb."

U 31.—This patient had had two confinements since her operation, and at the time of my report she was four months advanced in her third pregnancy. She wrote in February of this year: "Having received your letter I write to tell you of my little third son being born on July 29, 1910. The confinement was most satisfactory, and he is certainly a fine healthy boy. I have also a little daughter born the 1st of May last year (1912). I was very bad during pregnancy, but no trouble at the birth. She is a sweet little girl and quite strong."

The eight confinements in the recent cases were as follows:—

RETROVERSION GROUP.

Mrs. H.—Operation, December, 1909. Confinement of a girl in June, 1912. Attended by Dr. John Shaw. Chloroform and forceps extraction at the end of the second stage of labour.

Mrs. W.—Operation, January, 1911. Confinement of a boy on March 25, 1912. Labour was short; final stage with the aid of forceps.

Mrs. G.—Operation, May, 1911. A natural confinement on February 12, 1913. Attended by Dr. J. D. Windle.

PROLAPSE GROUP.

Mrs. D.—Operation, November, 1909. Normal and rapid confinement of a girl on May 4, 1911.

Mrs. B.—Operation, April, 1910. On July 18, 1912, Dr. Howard Distin wrote: "I have pleasure in informing you that Mrs. B. was delivered (by me) of a daughter on the 6th inst., and that her recovery has been quite uneventful."

Mrs. C.—Operation, December, 1910. I saw her in October, 1912, and she was six months pregnant, and as the pelvis was rather contracted, I advised induction of labour at the eighth month. This was done by Dr. F. W. Davidson, who reported that the delivery was easy, but the child was stillborn.

PROCIDENTIA GROUP.

Mrs. G.—Operation, January, 1911. Normal confinement of a girl on March 6, 1912. Labour rapid, "B.B.A."

Mrs. C.—Operation, March, 1911. Normal confinement of a girl on December 29, 1912. Labour lasted eight hours. Patient was attended by a midwife.

Among my previously recorded cases there were 60 pregnancies, of which 16 ended in miscarriage, and 44 went to full time; I concluded at that time that hysteropexy probably caused a slight predisposition to miscarriage. This conclusion appears to need revision in view of the later data, since in none of the present cases did a miscarriage occur.

In all, I have records of 62 confinements, whereof two were transverse presentations at seven months, and the patient who had these two children had had the same complication of a transverse presentation at seven months before the operation. One case was an induction at eight months on account of contracted pelvis, as above stated. The remaining 59 were confined at full term; two were breech presentations of unusually large children, weighing 14 and 11 lb. respectively, and the patient who had had these children had already had one normal confinement following the operation. Clearly the operation was not responsible for any of the above complications. Of the remaining 57 cases, there were 10 in which the use of forceps was resorted to; one was an occipito-posterior; in several the forceps was used just at the end, to expedite matters. Probably most practitioners who used forceps in only 10 out 57 cases would feel that they had used them rather sparingly. I feel justified in stating, on the basis of these observations, that hysteropexy causes no complications during pregnancy or labour.

(4) DOES PREGNANCY UNDO THE GOOD RESULTS OF THE OPERATION?

At the time of my last report I had notes of 29 patients whom I had examined after full time confinements. Six of the patients had had two confinements, and one had had three. In one case there was a partial retroversion, in the remaining 28 the uterus had kept in quite good position. Of my later cases, I have had the opportunity of examining eight after full-time confinements; one of them had had two confinements and one had had three. In all of these the uterus had kept in quite good position. I have, therefore, a total of 37 patients examined after having had between them 48 confinements; and in only one was there a partial return of displacement. Expressed in percentage, the tendency to return of the displacement after confinement may be said to be 2·7 per cent. and as this is no greater than the tendency to return of the displacement when no pregnancy has followed the operation, we may properly say that pregnancy and labour have no disturbing effect on the hysteropexy.

(5) IN WHAT PROPORTION OF CASES IS THE DISPLACEMENT PERMANENTLY CURED?

I have a note of the position of the uterus in 114 of my later cases. In 112, or 98·2 per cent., it was well slung up in good position; in one case where hysteropexy was done for retroversion there was a return of this displacement; and in one case where the operation was done for procidentia in a single woman the attachment of the uterus stretched sufficiently to allow of some prolapse; in this case the uterus was refixed and the perineum was sewn up again. The failures in this series may thus be put down as 2 in 113, or 1·7 per cent.

In my previous series I had notes of 227 cases, and if I add the present ones, arranging them in their groups, we get the following table:—

	Retroversion		Prolapse		Procidentia		Total	
	Number	Per cent.	Number	Per cent.	Number	Per cent.	Number	Per cent.
Uterus in good position	221	95·7	56	100·0	50	92·6	327	95·9
Partial displacement	3	1·3	—		1	1·9	4	1·2
Operative failure ...	7	3·0	—		3	5·5	10	2·9
Total	231	100·0	56	100·0	54	100·0	341	100·0

We may consider that an operation is satisfactory if its good effects are permanent in 96 per cent. of cases; as stated above, the later cases show a percentage of over 98.

In a few of the earlier cases of failure where I had an opportunity of inspecting the condition, I found that the uterus had become detached from the abdominal wall. To obviate this risk, two small matters of detail acquire importance: The first is that when the sutures are passed through the uterine wall the needle should be passed sufficiently deeply to get a good hold, though not deeply enough to penetrate the uterine cavity. The second is that the sutures should not be too thin and should not be tied too tight; otherwise they will cut through readily.

In order to obtain good results in cases of prolapse and procidentia, it is often advisable to carry out an anterior colporrhaphy and a perineorrhaphy at the same time; for otherwise the patient continues to experience the discomfort of a bearing-down feeling, due to the bulging of the vaginal walls. Even when these procedures have been adopted, there is some tendency to a return of the vaginal relaxation, and a cystocele is more apt to recur than a rectocele. In 32 cases in which an anterior colporrhaphy was done, there was a return of cystocele in 11, or 34 per cent.; whilst in 45 cases in which a perineorrhaphy was done there was a return of rectocele in only 7, or 15 per cent.

Besides colporrhaphy and perineorrhaphy, other operative procedures are often required. I have analysed the 199 cases under consideration, and find that a simple hysteropexy was done in only 49 cases, or 1 in 4.

In cases of retroversion, other operations carried out at the same time were curetting, trachelorrhaphy, perineorrhaphy, ovariotomy, myomectomy, appendicectomy, nephrorrhaphy, and radical cure of hernia; sometimes three or four of these proceedings were done at one sitting.

In 40 cases of prolapse, a perineorrhaphy was done in 35 and anterior colporrhaphy in 18, together with other procedures.

In 67 cases of procidentia, a perineorrhaphy was done in 65, and anterior colporrhaphy in 62, together with other procedures, making sometimes 4, 5, and in one case 6 at one sitting. The last mentioned included curetting, trachelorrhaphy, anterior colporrhaphy, colpo-perineorrhaphy, myomectomy, and hysteropexy. Such a combination we call, colloquially, "the round trip."

To sum up: The data furnished by these additional cases confirm even more favourably the conclusions arrived at in my last report, inasmuch as the general or local health of patients has been improved in 90 per cent. of cases; the position of the uterus has remained good in 96 to 98 per cent.; there have been records of 62 full-time confinements, with no complications that could be attributed to the operation, and including 47 natural labours; the uterus has kept in good position after labour in 97 per cent.; and the patients have been free of bladder disturbance or had no more than before operation in 85 per cent. of cases, 20 per cent. having actually improved.

Hysteropexy is, therefore, a valuable procedure in cases of retroversion, prolapse, and procidentia, inasmuch as it is simple, safe, permanent in its effects, and not harmful in the event of subsequent pregnancy.

Dr. HERBERT SPENCER said he was surprised at the large number of cases in which some gynæcologists performed these operations. He had only done the operations 27 times in 1,000 abdominal sections, and (he believed) Mr. Malcolm only 18 times in 518 laparotomies, whereas Dr. Giles had performed it 309 times in 1,000 abdominal sections, and of these 220 were uncomplicated cases of hysteropexy. The same difference in practice was noticed by Biermer, who stated that Dührssen operated on 50 per cent. of cases of retroflexion; Olshausen on only ½ per cent.

One reason why the speaker had performed so few of these operations was that, as ordinarily performed, it was an unscientific operation by no means free from danger, as shown by Dr. Giles's four deaths in 220 cases of simple hysteropexy and by Zweifel's five deaths in 336 cases (four of these five deaths being from septic peritonitis). In his own cases he had had two stitch-abscesses, which were almost unknown in his practice in other abdominal sections and were due, he thought, to the uterine stitches cutting and giving rise to slight oozing.

His other reason for performing so few of these operations was that he had seen many cases, some performed by himself and some by others, in which the operation failed to relieve the symptoms: in one recent case (operated upon by another gynæcologist) it had been followed by such severe pain and hæmorrhage as to necessitate the removal of the uterus. He noted that in Dr. Giles's careful and valuable investigation into the after-history of these patients, 42·2 per cent. of those inquired into (and possibly more of the whole series) had pain after the operation, though it is stated that 32·5 per cent. had less pain than before—a very doubtful justification in the speaker's opinion for such an operation.

The peritoneal attachment (ventrosuspension) and the muscular and fascial attachment (ventrifixation) as ordinarily performed were in his opinion unscientific and dangerous operations, giving rise to bands and holes which had caused strangulation of intestine on many occasions. And he regarded it as no justification for such an operation that large numbers of cases had been operated on without such accidents occurring; the possibility was always there.

In retroversion with prolapsed ovaries and dyspareunia he considered the shortening, doubling, or (as he preferred) the crimping of the round ligaments, better than hysteropexy. In procidentia in women beyond the child-bearing period of life ventrifixation was a useful adjunct to colporrhaphy and perineorrhaphy, but care should be taken completely to close the peritoneum above the bladder so as to prevent internal strangulation of intestine.

For the reasons he had given he thought these operations were being done much too frequently and that one should hesitate a good deal before advising for conditions involving no risk to life operations with an immediate mortality of nearly 2 per cent. in skilled hands, which involved risks of infection, intestinal obstruction and hernia, and in which there was pain after the operation in 42 per cent., and frequency of or pain on micturition followed the operation in 23 per cent. of the cases.

Dr. ARCHIBALD DONALD said that he would confine his remarks to the indications for the operation, and even limit them still further to its indications in cases of mobile retroversion. As far as this part of the subject was concerned Dr. Griffith's introduction was interesting more from what he left out than from what he said. He indicated that the operation was required when the displacement was such as to interfere with the comfort of the patient and to prevent her performing her duties. One would infer that he regarded retroversion *per se* as sufficient indication for the operation, and this inference was strengthened when he said that the failure of pessaries to keep the uterus in position was an indication for ventrifixation. In a later passage, however, he said that the operations should not be performed where the retroversion gave rise to no local symptoms. He gave no statement as to what local symptoms a retroversion might be expected to cause. He (Dr. Donald) would like to ask Dr. Griffith what he considered the symptoms of retroversion to be. The whole crux of the question was passed over. The point was: Why do some cases of retroversion cause trouble while in other cases the patient suffers no inconvenience? In the cases which gave rise to symptoms, the troubles were not only those of a mechanical kind, but consisted in disorders in the menstrual function and uterine secretions (metrorrhagia, menorrhagia, dysmenorrhœa and leucorrhœa). These conditions were mentioned in most text-books as symptoms of backward displacement. The first variety of retroversion (i.e., without symptoms) ought to be called uncomplicated mobile retroversion, and the second variety complicated mobile retroversion.

By far the largest number of suspension or fixation operations were performed for complicated mobile retroversion, and many performed these operations—and these operations alone—in the hope of curing the symptoms just mentioned. In other words, many operators believed that these symptoms were caused by the retroversion. They were supposed to be produced through the medium of a passive congestion. There was a doubt as to how this passive congestion of the uterus is produced. Some thought the matter was disposed of at a meeting of the Obstetrical Society thirty-nine years ago, when Dr. John Williams stated that Dr. Squarey had shown him a uterus (presumably removed post mortem), which had been slightly retroflexed, and in which there were marks on each side which were said to have been produced by the utero-sacral ligaments during life. It was an extraordinary thing that there had been no corroboration of this observation in the years that had since elapsed, especially when we considered the numbers of cases in which the abdomen had been opened for retroversion in all degrees, and in which it could have been easily verified.

There had never been any proof that retroversion produced interference with the blood return from the uterus; and there was not a scrap of evidence that any amount of congestion of the uterus will lead to changes in the endometrium which will cause menorrhagia, metrorrhagia and leucorrhœa. There were many cases which went to prove that a woman may have retroversion for years and yet no changes occur in the organ. Further, the same changes as those said to be produced by retroversion may exist—in fact do exist frequently—in a uterus that is anteverted. The practice, therefore, of stitching up a uterus for the cure of symptoms which had not been proved to be due to the retroversion was unscientific.

There were operators who were not so dogmatic as to retroversion being alone responsible for menstrual troubles and leucorrhœa. These talked sometimes of an "accompanying" endometritis or metritis. They did not try to explain the connexion, but from an empirical standpoint they treated the diseased conditions of the uterus by curetting and then attended to the retroversion. Their attitude was that they did not want to worry about theories. This was an easy attitude of mind and saved a lot of trouble, but it was not the scientific attitude. Further, if it were only the *condition* and not the position of the uterus that mattered, ventrifixation was unnecessary in these cases.

Dr. Donald's view was that in all these cases of complicated mobile retroversion there was a diseased or abnormal condition of the uterus—an endometritis, or diffuse adenoma, or altered endometrium, accompanied sometimes by a chronic metritis or hypertrophic enlargement of the mesometrium—which co-existed with the retroversion and was often the cause, but never the effect, of the retroversion. This abnormal condition was found still more frequently with anteversion. But in that case no one ever suggested that it was due to the anteversion, although the fundus of the uterus might be found hanging low down, and the dragging symptoms be as severe as in any case of retroversion; and no one practised the lifting up and fixation of the uterus in these cases. His own practice was to curette these cases of chronic endometritis (a convenient but not always a pathologically correct term) and to disregard the position of the uterus. It was only on the rarest of occasions that he did a fixation or suspension operation for mobile retroversion. These exceptions were in cases where the uterus remained enlarged and heavy after curetting and where the dragging or pressure symptoms were prominent as the result of an old-standing chronic metritis.

Dr. MACNAUGHTON-JONES said it was difficult to avoid introducing ancient history into such a discussion as the present, and they necessarily had a good deal of this to-night. In 1901, in the British Gynæcological Society, he had opened a discussion by a paper on "Retroversion of the Uterus: its Etiology, Clinical and Pathological Consequences, their Preventive, Palliative, and Radical Treatment."[1] In that discussion, in which several distinguished provincial Fellows of the Society, as well as Metropolitan, including the late Professor Japp Sinclair, Professor John Taylor, Dr. William Armstrong, and the venerable father of their President, took part, the whole subject, including its operative treatment, was exhaustively discussed. Most of the points referred to by the speakers to-night were dealt with, the discussion occupying two whole evenings.

Having excluded all the obvious cases—which are many—where operation is not indicated, he grouped those where it is as follows: "An immovable or irreducible uterus, or a reducible uterus in which the associated condition, either in the uterus itself, in contracting peritoneal folds, or adnexal adhesions, make it clear that no pessary will effect a cure or enable the uterus even temporarily to remain in position, should be treated by operation, the nature of which would depend on the age and child-bearing prospects of the woman; on the amount of adnexal disease; the need there might be for radical interference; on the condition of the vaginal outlet and perineum; such complications as cystocele or rectocele; and lastly, on the extent of uterine disease that is co-existent with the displacement."

---

[1] *Brit. Gyn. Journ.*, 1901, xvii, pp. 97-127.

With regard to operation, he could not criticize the hysteropexy advocated by Dr. Giles, as he had never himself performed it. In the earlier years he had done Alexander's, and later, the Alexander-Adams operation, and the various methods of fixation and suspension by looping of the round ligaments, and Kelly's operation. From 1904 he had resorted to the following method, which he had brought before the Gynæcological Society in 1905, and the scheme of which, with drawing, was published in its journal of that year: The abdomen is opened by a low incision. A strong gut suture, to last from eighteen to twenty days, is carried through the peritoneum and peritoneal fascia, and the round ligament close to the cornu of the uterus, at one side. The same manœuvre is practised at the other. The free end of the first is carried across and brought through the subperitoneal fascia and peritoneum of the opposite side, and the same step is taken with the free end of the other. There are thus two sutures at either side, which pass through the peritoneum and subperitoneal fascia of both sides, including a small loop of each round ligament. The peritoneum is closed, and these sutures are tied last. Only in rare cases is the uterus included in any suture.

He was of opinion that a clear distinction should be made between ventrosuspension and ventrifixation. He did not think that fixation of the uterus should be practised during the child-bearing period of life, unless under very exceptional circumstances. He had never had any bad results from any fixation or suspension operation of any kind that he had ever done. He had photographs of quite a number of children, including twins, born after suspension operations on the mothers. In many of these the ovaries were resected or an ovary was removed or curettage done at the same time. In a few cases there had been transverse presentations. Many years ago he had brought before the Gynæcological Society a case in which he had raised and fixed the uterus in a patient with exaggerated anteflexion who was suffering from constant micturition. The result was perfectly successful, as it had been in two other cases that he had done. In the first case the patient had subsequent pregnancies. Years after he operated upon her for a cystic ovary, and found the uterus attached to the peritoneum by two long adhesive bands.

Miss Frances Ivens stated that her operative experience for retroversion was confined to 150 cases of Gilliam's operation. In the last fifty the modification introduced by Mayo had been adopted, the round ligament being drawn through the peritoneum at the internal ring so that no abnormal slit was left as in the original Gilliam. This method required rather deeper anæsthesia if the muscles were well developed, but presented no special difficulty. There had been one fatality in a case complicated by chronic appendicitis. Death took place suddenly on the fourteenth day, and was possibly due to an embolus. About 93 per cent. of the cases had been followed up, and were very satisfactory. A considerable number had since borne children with no special difficulty and with no relapse. In this series definite symptoms had been present. Among the cases were several instances of retroversion associated with attacks of reflex vomiting where the operation had given complete relief.

Dr. **HANDFIELD-JONES** did not think that "hysteropexy" was a very desirable name, and thought that the term "ventrifixation" was sufficiently descriptive. Most authorities were in agreement that the ordinary operation by which the anterior wall of the uterus was sutured to the abdominal wall above the bladder was the best surgical procedure. It had the great advantage of leaving the upper part of the uterus free in the event of future conception. The point most prominently brought out by the papers read was the great difference of opinion held by various gynæcological surgeons regarding the frequency with which the operation should be performed. He did not consider that cases in which the ovaries and pubes were removed for disease, and then the uterus was stitched forward, should be considered cases of ventrifixation, for in the vast majority of these cases there was no need to suture the uterus forwards after the appendages had been removed. Also, he did not think that cases where the symptoms were due to chronic congestion, subinvolution, or disease of the endometrium should be treated by forward fixation. In these cases, curettage, the use of pessaries, and other palliative measures, were quite able to bring about a satisfactory result. Personally, he had only done the operation about thirty times in his last thousand cases of abdominal section, and he held strongly that the suitable cases needed to be selected with great care. He had found the operation most useful in middle-aged women, who found relief from the wearing of a pessary, but after a reasonable time were unable to dispense with this support. Again, in cases where the pelvic floor was abnormally weak, and where narrowing of the vagina, and repairing of the perineum were not sufficient to prevent the sensations of dragging and prolapse. There were also a few cases in which prolapse of ovaries, not coarsely diseased, was relieved by forward fixation of the uterus. Everyone was agreed that the mortality from the operation was very small, and that it did not interfere with future pregnancies. He had seen much distress caused in some cases by the uterus being fixed at too high a level, and in three cases had given the patients immediate relief by re-opening the abdomen and setting the organ free. In all cases it was well to employ a week or ten days in preparing the patient for the operation by rest in bed, hot douches, and glycerine tampons in the vagina. If this precaution was taken the patient was much less likely to be troubled by protracted aching and dragging pain at the site of the fixation.

Dr. ARNOLD W. W. LEA stated that for this discussion he had examined the records of 500 consecutive cases of abdominal section, performed for various pathological conditions. Of these 75 were operations in which ventrifixation or ventrosuspension of the uterus had been performed. This operation has been almost entirely undertaken for backward displacements of the uterus, and, in a few cases, of extreme prolapse. The retroflexions were often complicated by adhesions about the appendages, and also of the uterus to the pelvic floor. Prolapse and cystic conditions of the ovaries were also frequently present with various lesions of the Fallopian tubes. These patients were usually suffering as a result of some infection after childbirth. In many of the cases, as Dr. Griffith mentions, there is a laceration of the cervix, some degree of prolapse of the uterus, a cystocele, also laceration or extreme laxity of the pelvic floor.

Dr. Lea considered it advisable to do all that was necessary at the same time. This might occupy an hour, but with modern anæsthesia, and with the advances in technique, the patient was well able to bear these multiple procedures. All operations on the pelvic floor should be completed before an abdominal section was undertaken. This must be associated with careful inspection of the appendages and the adoption of suitable conservative measures. It should also include an examination of the vermiform appendix in every case. Dr. Lea was opposed to treating these cases with pessaries, as the pessaries rarely had any curative effect, except in cases of simple retroflexion, usually following confinement. In some instances Dr. Lea had used the transverse suprasymphyseal incision in preference to the usual median incision of the abdomen. The technique of this operation was first accurately described by Pfannensteil, of Kiel, and has also been practised by others, including Dr. Arthur Wallace, of Liverpool, who contributed a paper on the subject as early as 1903. Three coloured drawings were shown to indicate the method by which the incision is made. This affords a very good view of the condition of the pelvis. It is not suitable for myomata, ovarian tumour, or for cancer, but for retroflexion and conservative measures on the appendages it presents certain advantages. It is not suitable in the cases of obesity. It was not necessary to describe the operation in detail, but the advantages are that if the patient is placed in the elevated pelvic position the intestines are kept out of the way very easily by the introduction of a long strip of gauze, and do not interfere in any way with the operation. This position is to be regarded as an essential feature of the procedure. Dr. Lea had performed this operation, altogether, in about ninety cases. So far as he had had the opportunity of observing no hernia had occurred. They have had many cases of labour in the St. Mary's Maternity Hospital in which ventrifixation had been performed, almost all of which had been delivered without any complication.

Dr. Griffith, in his address, referred to the practice of some operators of attempting to produce adhesions in cases of Cæsarean section, in order to facilitate the performance of a second operation if this were required. Dr. Lea stated that this procedure was both harmful and unnecessary. The essential point for obtaining success in Cæsarean section was to do a straightforward operation, removing the child, placenta, and membranes, closing the uterine wound, and finally completing the operation as speedily as was consistent with safety.

Dr. Tate considered that the operation of ventrifixation was of great value in selected cases. During the ten years from 1900 to 1910 he had operated in 44 cases at St. Thomas's Hospital. Dr. Wyatt had followed up the after-history of these patients, chiefly from the point of view of subsequent pregnancies. Of 25 patients who had been traced 7 had borne one or more children since the operation. In not a single case had there been any complications during the pregnancies or labours. This favourable result was due to the technique carried out in the operations, care being taken always to leave the fundus and upper part of the uterus free and to pass the fixing sutures only through the lower part of the uterus. Dr. Tate entirely disagreed with one speaker, who considered the operation should not be performed during the child-bearing period, as he considered that these radical operations were specially called for in the case of women in the prime of life—women who had to earn their living, or who were engaged in looking after their homes. Dr. Tate only recommended the operation of ventrifixation in cases where pessaries and other methods of treatment had failed to relieve. He also pointed out the necessity of amputating the cervix in cases of hypertrophic elongation where this was present before proceeding to fixation of the uterus. Dr. Tate also referred to the value of this operation in some distressing cases of incontinence of urine, occurring in women usually about the age of 40 to 50 when there is weakness of the sphincter of the bladder. In this patient urine runs away on coughing, sneezing, or any sudden movements, and causing the greatest discomfort. Pessaries are quite useless in this condition, and Dr. Tate has found a ventral fixation quite cure the trouble. Dr. Macnaughton-Jones reported a similar case many years ago. The ventral fixation, by fixing the uterus, also steadies the wall of the bladder, and in this way the relief of the trouble may be explained.

Dr. HUBERT ROBERTS thought that the operation was one that should only be performed in certain cases, and then that it should be confined with other procedures, such as perineorrhaphy and methods for the cure of rectocele and cystocele. Surely a very large number of women who attended the out-patient departments of our hospitals in which retroversion was "discovered" did not need a ventrifixation. Many of these patients did not even know that they had a retroversion, for there were few if any symptoms, and if there were any symptoms they were those of prolapse. Pessaries, properly fitted, gave relief, and Dr. Roberts argued that in a large number of cases this was all that was necessary. Granted that an operation was needed, there appeared to be two groups of cases: (*a*) Young women with retroversion, (*b*) old women with retroversion. In both classes of cases prolapse in some form or other was also present, often with descent of the ovaries.

Dr. Roberts was in the habit of teaching that falling of the womb was the result of relaxation of the pelvic floor, and that retroversion was often the first sign of descent; if so, surely operations which tended to prevent descent of the floor of the pelvis, combined with the cure of rectocele and cystocele, or amputation of a hypertrophied cervix, were more to be aimed at than a mere "suspension" or "fixation" of the uterus. These latter operations might put the uterus in a better position, or even alleviate ovarian prolapse, but they would not cure *descent* of the pelvic floor or the rectocele and cystocele of which the patients so often complain. Therefore Dr. Roberts argued that it was not quite fair to say that ventrifixation in any form, as an operation *per se*, was of such great value as some of the speakers maintained who introduced this discussion.

Dr. Roberts had in certain cases performed either Gilliam's operation or a ventrifixation. He did the former in young women, and fixation only after the child-bearing period had ceased. As regards results, there had been no complications with subsequent child-birth after Gilliam's method. In old women, fixation of the uterus was not without its risks. Dr. Roberts had performed it thirty-one times with two deaths; in both of these there had been lung complications which ended fatally. In one curious case malignant disease supervened in a uterus which had been "fixed" up to the abdominal wall nine years previously. The cancer affected the uterine body and had involved a considerable area of the anterior abdominal wall. The uterus was removed altogether with the affected parietes to which it was fixed. The sutures used had been kangaroo tendon. Dr. Cuthbert Lockyer had assisted Dr. Roberts at the operation. The disease was columnar-celled carcinoma of the body of the uterus. The woman recovered. Profuse hæmorrhage and pain were the symptoms that led to the operation.

Dr. Roberts asked Dr. Giles what symptoms led him to think it necessary to perform "the specific operation of hysteropexy." Surely 508 hysteropexy operations seemed a very large total from 1909 to 1912. Dr. Roberts's cases only amounted to 31 hysteropexies in all, and even with these some variety of perineal plastic operation had been necessary. If there were symptoms and indications for the operation, surely such conditions must be clearly defined before it could be recommended or so extensively practised.

Dr. Roberts concluded his remarks with the opinion that, because a uterus was retroverted, operation was not necessarily indicated at all, and that for the relief of prolapse and procidentia plastic vagino-perineal operations were in many cases sufficient.

If suspension or fixation operations were frequently performed, the symptoms leading to interference should be well marked enough to justify their performance. Dr. Roberts had found that Gilliam's operation was not always successful, and he thought that ventrifixation was not often necessary; if it were, it should be used in combination with operations that tended to cure the descent of the pelvic floor, and in women past the child-bearing period.

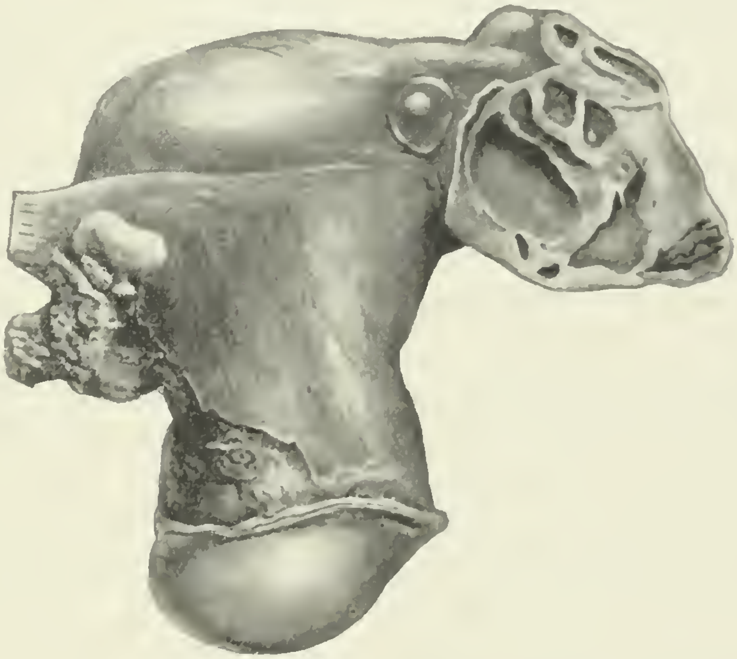
Mr. BECKWITH WHITEHOUSE said that although he could not lay claim to the large experience of other speakers, particularly as regards the after-results of various operations for fixation of the uterus, yet the few observations that he had been able to make might be of some interest to the Section. In the first place, he would like to emphasize the fact that in his opinion too many operations were performed for simple uterine displacements. The tendency was growing, at any rate in some centres, to fix a uterus for what he considered were quite inadequate causes. One reason for this was the fact that displacements are extremely frequent, and practitioners are liable to think that pelvic pain of any and every description can be relieved or cured by correcting this displacement by operative means. In the second place, the technique is not particularly difficult, and there is not the same hesitation in recommending the procedure as for a more serious operation. He would like to state that in his experience fixation of the uterus does *not* cure a great many of these patients suffering from pelvic pain, and unless more care is exercised in the choice of cases the operations are liable to be brought into discredit.

The last few years have been remarkable in the number of different operative procedures that have been brought forward for attaining the same end. Quite a short time ago he had been taught to remedy a displaced uterus by fixing it to the abdominal wall, but he had since learnt that the result of this operation was not always an unmixed blessing to the patient. On one occasion, at least, he had seen intestinal obstruction produced by a band between the uterus and the abdominal scar. Furthermore, even when a uterus is firmly fixed in this position, it is not infrequent to see puckering of the abdominal wound and to hear the patient complain of much "dragging" sensation and pelvic discomfort.

Of the intra-abdominal methods advocated within recent years, his own preference is for the "sling" operation of Clarence Webster, in which a loop of each round ligament is drawn through a hole made in the corresponding broad ligament and sutured to its fellow and to the posterior wall of the uterus. For this operation to be effective and safe, it is important that several technical points be followed closely. In the first place, there is considerable tension upon the two ligaments, and therefore strong silk should be used to suture the tissues. Secondly, it is most important to suture each ligament to the uterine wall and not to rely upon the "sling" formed by suturing them together. The non-observance of these two points was the cause of two accidents that arose in the earlier cases treated by this method by Dr. Thomas Wilson and himself. In the case of both patients, catgut was used instead of silk.

and the round ligaments were not sutured to the uterine wall. Intestinal obstruction occurred in each through a loop of small intestine becoming constricted between the round ligaments and the uterus. One patient recovered after a second operation to relieve the obstruction; the other, unfortunately, died—a very serious "contretemps" when one considers that the procedure is after all an "opération de complaisance." This risk can, however, be entirely obviated by adherence to the technique previously mentioned.

As regards the after-history of this operation, personally he was not in a position to quote figures, as at the General Hospital, Birmingham, the operation had only been adopted for about the last two and a half years, and it was too early to judge results. One patient had had a recurrence, and he had repeated the operation. At the second laparotomy, he found that the ligaments were very small and had stretched considerably, although the attachment of the same to the uterus was secure. The firm adhesion of the round ligaments to the uterine wall is well illustrated in the drawing brought forward (*see* figure), which shows a uterus that he had removed on account of recurrent inflammatory trouble, where eighteen months before a ligamentopexy and salpingostomy had been performed. With the exceptions noted above, he had



Uterus removed eighteen months after the operation of posterior ligamentopexy by Clarence Webster's method. The figure shows the firm adhesion of the round ligaments to the posterior wall of the uterus. The left appendages were removed at the first operation and salpingostomy was performed upon the right Fallopian tube.

been quite satisfied with the results of the operation, in so far as he had been able to judge. The uterus had remained in excellent position, was freely movable, and was not at all tender.

Until recently he had not had an opportunity of studying the effects of pregnancy after the operation. However, one patient previously sterile, upon whom he had performed the operation in September last, was now in the third month of pregnancy, and so far the gestation was pursuing a perfectly normal course.

He also observed that he thought the intra-abdominal operation through an abdominal incision far superior to attempts to rectify uterine displacements by extra-peritoneal or vaginal methods. The chief reason was that it is possible to see what one has to deal with and to deal with it effectively. Upon more than one occasion, when from bimanual examination it had seemed that a uterus was freely movable, he had been surprised to find numerous long and very delicate adhesions present, which bled easily upon rupture. These would undoubtedly give rise to further trouble if an attempt was made to operate by the Alexander-Adams or vaginal fixation methods.

Occasionally both Dr. Thomas Wilson and he had fixed the uterus by suture of the round ligaments in front of and to the anterior wall and fundus of the displaced organ, but he did not consider the ultimate result so perfect as regards position.

Gilliam's operation he disliked on the ground that it produces pockets between the round ligaments, uterus, and abdominal wall, into which a loop of intestine may very easily slip. In the few cases where the method had been tried, there certainly had been no trouble, but nevertheless the fear was constantly there, and for this reason it had been given up in favour of the "sling" operation.

Dr. FAIRBAIRN wished to speak only on the indications for the operation. Of Dr. Griffith's clear indications many would be accepted without question, because there were good reasons for an abdominal operation quite independent of ventrifixation; as, when the uterus is retroverted and more or less fixed by adhesions, because of the salpingo-oöphoritis causing fixation; when the uterus is pressed down by a tumour, because of the tumour pressing it down; after enucleation of a fibroid from a retroverted uterus; because of the fibroid, and so on. The inflammatory condition or the tumour is the indication for operation, not the retroversion. In selected cases of prolapse also there is a place for the operation, but the discussion showed a marked indifference of opinion when an operation was done in cold blood for simple backward displacement. On this point he was in complete agreement with Dr. Munro Kerr, who said the operation should only be done when "absolutely necessary." The problem was to decide when it was absolutely necessary, and he could not help thinking that those who did these operations by the hundred were still living in the mid-Victorian era of gynæcology, when uterine displacements were thought to be of supreme moment in the causation of the ills of womankind. Dr. Ivens's statement that she performed ventrifixation only for cases of backward displacement with symptoms was no help, for what we all wanted to know was, what are the symptoms? When he heard that Dr. Ivens included dyspepsia as one of the symptoms for which she performed ventrifixation, he could only wonder if there were any symptoms that some one or other would not ascribe to these terrible simple backward displacements. How about headache? He would ask Dr. Giles and Dr. Briggs, who had so large a percentage of ventrifixations among their operations, what indications they found for this treatment of simple mobile displacements.

Dr. FARQUHAR MURRAY reported some observations made by Mr. Bryden Glendining and himself, at Chelsea Hospital for Women, on the alteration in the bladder capacity following the operative treatment of uterine displacements. The cases selected were uncomplicated by any definite cystocele or deficient perineum. The two methods of operation were direct fixation of the anterior uterine wall by stitches to the fascia and shortening of the round ligaments by Gilliam's method or traction of loops directly through the fascia. The capacity was estimated by distension at low pressure with normal saline, the patient herself indicating when the bladder was comfortably full. The results were controlled by bacteriological and microscopic examination of the urine at each observation. The bladder capacity was measured before operation, before discharge from hospital (at least ten days later), and in a few cases one month later. Six round ligament cases and ten fixation cases were examined. Half of each variety showed an increased, the remaining half a decreased, capacity. Average increase, round ligament cases, 7 oz.; average increase, fixation cases, 4½ oz.; average decrease, round ligament cases, 2 oz.; average decrease, fixation cases, 6½ oz. Two round ligament cases seen one month later showed a capacity greater than that before operation; while of six fixation cases, three showed a capacity greater than their original, but three were distinctly below it (two of them having become worse since discharge).

The PRESIDENT (Dr. Amand Routh) thought the discussion would be of great use, but he agreed with Dr. Fairbairn that it had not come down to the bedrock question of the concrete cases where the operation became "necessary." He thought the subject should be divided into primary and accessory ventrifixation. The operation was often done after the abdomen was opened for other indications, such as removal of the appendages, myomectomy, &c. Ventrifixation then did not add to the risk. It was entirely different, however, in the primary operation when performed for various types of mobile retroverted prolapsed uterus.

Several speakers, among them Dr. Munro Kerr, had said that ventrifixation should only be done when it was "absolutely necessary." He doubted if the primary operation was at all frequently a necessity, that is to say, that the existing conditions could not with patience and experience, and with less risk to the patient, be treated equally well by operations of a plastic nature, or by palliative treatment. A subinvoluted chronically inflamed retroverted uterus would often become anteverted spontaneously a few weeks after a curettage and a course of purgatives and ergot. He only knew of one concrete condition where it was necessary to ventrifix a mobile retroverted uterus, and that was where in addition a persistent prolapsed ovary prevented the use of pessaries. Nothing could exceed the relief afforded by the operation then, but in that case it was a conservative operation of less risk than the alternative operation of removal of the prolapsed ovary. He hoped that in their replies the speakers would deal with the concrete indications for primary ventrifixation where the uterus was retroverted but mobile.

Dr. GRIFFITH, in reply, said he was not prepared to support all that had been said by those in favour of this operation, but he was ready to defend his own selection of cases which he had placed before them in his introduction to the discussion. It was clear that some of the differences of opinion which existed were due, as evidenced by Dr. Donald's remarks, to the entirely different point of view taken by the speakers with regard to the symptoms to be attributed to retroversion and prolapse. Some attributed dyspepsia or neurasthenia to a retroversion which caused no direct local symptoms; others said that there were no symptoms unless the patient was neurasthenic. Both groups based their treatment on these opposing views and each condemned the action of the other.

Dr. Griffith would not offer to convert those who differed from him, but he would ask those who condemned the operation in all cases to investigate the question again with an open mind, and he had no doubt as to the result if the cases were properly selected. He would also ask those who held extreme views as to the effects of retroversion, to reconsider the question, for their practice was undoubtedly liable to bring the operation into great disrepute.

Dr. Griffith's 77 cases were distributed over a period of twelve years.

Dr. Briggs, in reply, stated that for fifteen years his own earlier prejudices and convictions against ventral fixation prevailed. Later, from the tests of a few of the operations at long intervals ventral fixation asserted itself. If he had now, during the last fourteen years, operated on a large number of cases his efforts were the outcome of early caution and subsequent selection amidst the demands of a densely populated district. Briefly, uterine displacement as a clinical entity resembled inguinal hernia; it was not always conveniently left alone or treated by an instrument and the family doctors who sent the patients, and the patients too, had realized the value of radical cures in certainly not a diminishing proportion of each.

Dr. Arthur Giles, in reply, said that although in his introductory remarks he was necessarily confined to the question of after-results, yet the discussion had turned much more on the subject of the indications for hysteropexy, and the questions that had been asked him had been almost entirely on these lines. Several speakers had expressed the view that the importance of accessory plastic operations had not received sufficient attention. The restricted time at his disposal had prevented him from giving some figures which he had prepared, which were as follows: Among the 200 additional cases reported in his paper there were 40 cases of prolapse and 67 cases of procidentia; in the 40 cases of prolapse a perineorrhaphy had been performed 35 times and colporrhaphy 13 times; in the 67 cases of procidentia a perineorrhaphy was done 65 times, and an anterior colporrhaphy 62 times. His experience was that in cases of prolapse and procidentia neither the repair of the parts below nor the slinging-up of the uterus above was sufficient by itself, as in either case the operation was almost always followed by a return of the symptoms, but by combining the abdominal support with a plastic operation on the vagina and perineum the results were satisfactory; he wished to say to those who looked with disfavour on the surgical treatment of displacements that they probably missed a great deal of gratitude in life; at least his experience was that his patients derived an enormous amount of relief from these operations, and showed a corresponding amount of gratitude and appreciation.

With regard to the question of indications for hysteropexy, he recognized several categories. First, cases of adherent retroversion and retroversion complicated by tubal or ovarian disease, or by a small fibroid suitable for myomectomy; in all such cases the treatment of the displacement was naturally secondary to the treatment of the other condition. Secondly, cases of prolapse. Thirdly, cases of procidentia. Fourthly, certain cases of mobile retroversion where the alternative to operation was the wearing of a pessary indefinitely; in such cases he stated frankly that he operated, not because the operation was necessary but because it was desirable. Professor Briggs had, he thought, drawn a quite correct parallel in saying that the radical cure of hernia was advisable in order to avoid the wearing of a truss; and, for his own part, he thought that one of the greatest advantages derived from the improved conditions of abdominal surgery was that it opened the door, by means of a radical operation, for patients to be relieved of all the drawbacks and discomforts incidental to the wearing of a pessary. With many patients the periodic examinations were exceedingly distasteful, and his view was that if the patient desired relief from that kind of thing she was entitled to have it. He felt quite sure that if those who looked upon the surgical treatment of displacements with disfavour could be induced to resort to this form of treatment, they would rapidly become converts to its many advantages.

Obstetrical and Gynæcological Section.

April 3, 1913.

Dr. AMAND ROUTH, President of the Section, in the Chair.

Two Cases of Fibromyoma of the Uterus undergoing Sarcomatous Degeneration.

By M. HANDFIELD-JONES, M.D.

CASE I.

MRS. S., aged 51, married, was admitted to St. Mary's Hospital on May 31, 1906. She had been conscious of the existence of an abdominal tumour for some years. For the last sixteen years the patient has had floodings at her monthly times, which necessitated her keeping to her bed for five days each period. Twelve years ago the patient noticed a lump in the lower part of her abdomen, which had slowly increased until three months ago, since which time it has grown very rapidly. During the last two months there has been continuous bleeding, irrespective of monthly times. The patient has given birth to two children.

Present condition: The patient is very wasted and anæmic. There is a hard, irregular, and bossed abdominal swelling, reaching 2½ in. above the umbilicus. It is softer in some parts than in others.

June 8, 1906: Hæmoptysis has been present during the last six days, but no tubercle bacilli have been found. The temperature has ranged between 100° F. and 101° F. during the time she has been in hospital. Patient was anæsthetized, and an abdominal incision was made and increased to 7 in. in length. The uterus was found to be enlarged to about 8 in. long by 8 in. broad at its broadest point, by a fibroid. In shape smooth and regular, except in several places where the capsule appeared to have had holes punched in it to allow a soft and bleeding and exceedingly friable growth to protrude, the largest piece being at the left side of the top of the uterus, corresponding to the swelling noticed by the patient during the last three weeks. A considerable amount of blood-stained fluid ran out of the abdominal wound, with bits of soft growth floating in it. The uterus was delivered through the abdominal wound. As the patient was very collapsed the wound was sewn up from above downward by silk passing through the whole thickness of the abdominal wall, till the wound was about 2 in. in length. The uterine and ovarian arteries were then ligatured on both sides, and the uterus, with both ovaries—which were healthy—was removed. The remainder of the abdominal wound was then sewn up with silk stitches passing through the whole thickness of the abdominal wall. During the operation, which lasted one and a quarter hours, the patient was given strychnine $\frac{1}{10}$ gr., and also $2\frac{1}{2}$ pints of saline under the breasts. The patient never regained consciousness, though she became very restless and noisy. She died at 5.25 p.m., just two hours after the end of the operation.

Post-mortem examination made through the abdominal wound: Right lung showed old scar at apex, and a few pleuritic adhesions. Left lung quite normal except for old scar at apex. Left kidney showed an old infarct. Large mass of new growth, soft and white, found in the meso-sigmoid, with small nodules here and there. One old calcified mass of tubercle on the mesentery of the small intestine. Parietal peritoneum thickened in front of the uterine site, and reddened from the growth. Other thoracic and abdominal organs quite normal.

Microscopical examination of the soft parts of the tumour removed, showed a sarcoma containing large oat-shaped spindle cells, and a much smaller number of round cells.

Pathological Report by T. G. Stevens, M.D.—The specimen comprises a very large uterus removed on account of a malignant growth. The peritoneal surface of it is studded with areas surrounded by hæmorrhage, which indicate those places where the growth has perforated the muscular wall of the organ. The uterine cavity can be seen here and there, with smooth and compressed walls, but for the most part the endometrium is destroyed and the growth is fungating through. The growth has for the most part a yellowish colour, which clearly marks it off from the muscular wall. The bluish-grey areas in the growth are not cartilage, as they certainly appear to the naked eye, but represent areas of the growth, which have undergone hyaline degeneration. Microscopic sections have been made from many portions of the tumour, and there is no doubt from them that the growth is a sarcoma. It varies in structure in different places. At the young growing edges it consists of large spindle cells arranged in interlacing bundles, and presenting different appearances according to the way in which the cells are cut across. In the parts near the centre, and in all the older parts, the spindle-celled character is lost, and large rounded cells appear instead, often having giant cells with many nuclei amongst them. There is nothing in the tumour to indicate what was the primary seat of the growth, but after a careful consideration of the whole specimen, and bearing in mind the length of the clinical history, there is some reason to believe that it is a specimen of sarcoma invading and destroying a uterine fibromyoma. This opinion is based on the fact that in sections taken from the centre of the tumour islets of smooth muscle tissue arranged as in a fibromyoma can be found. These islets often show the hyaline degeneration which is so characteristic of uterine fibroids, whose blood supply has been inadequate. These areas, too, contain only small blood-vessels, as would be the case in a fibroid, differing entirely from the large blood-vessels found in the uterine wall. These can be seen in the section, which is taken from the uterine wall. The section which shows the unaltered endometrium is made up of similar fibromyomatous tissue and new growth, so far removed from the uterine muscle that it cannot be believed to be a part of it. Although the evidence seems fairly conclusive that a fibroid has been present and has been destroyed by the new growth, there is no evidence to show that the new growth has arisen in the fibroid, or that it is a degeneration of a fibroid. It has not been possible anywhere to demonstrate either the muscle or fibrous tissue of the fibroid actually becoming sarcomatous. Taking all these points into consideration, we believe that this is an instance of a uterine fibroid which has been destroyed by a sarcomatous growth arising somewhere in its neighbourhood.

Case II.

Mrs. B., aged 60, married. One child when aged 18, none since. She was admitted to St. Mary's Hospital on February 13, 1912, for pain and swelling in the right side of the abdomen. Menstruation had ceased at the age of 50, but she had suffered with severe floodings for some years. Five weeks ago the patient noticed a lump, which was not painful, in the right side of the abdomen. The swelling gradually increased in size, and caused abnormal frequency of micturition. Three months previous to admission, whilst working, she had a sudden hæmorrhage from the vagina, which lasted three days, and was rather like a period, but she has seen nothing since. The patient does not think that she has lost weight markedly. Abdominal examination showed the presence of a large mass, about the size of pregnancy at the fifth month, which rested on the pelvic brim, and reached up on the right side a hand's breadth above the navel. The tumour was extremely hard, but felt somewhat fluctuant at the right upper extremity. Vaginal examination showed that the cervix was lying high in the pelvis, and seemed closely connected with the abdominal tumour.

On February 12, 1912, the patient was placed on the operating table, and abdominal section performed. After separating a few adhesions, and clamping and tying the round ligaments, the mass was delivered through the wound. The tumour was seen to be a large growth of the uterus, very dark in appearance, with very large veins passing from it into the broad ligaments. On the right side there was an extension of the mass, which gave the appearance of a large cyst of the right ovary adherent to the uterine tumour. There was considerable difficulty in separating and tying off the lower attachments of the whole of the mass, and bleeding was rather free. The operation, however, was successfully finished, and though shock was considerable, the patient made a smooth recovery. When last heard of her condition was satisfactory. The *left ovary* and tube were not removed, but it was difficult to define the right ovary and tube, and it was thought that they were blended with the tumour.

Pathological Report.—The specimen comprised the uterus and possibly the appendages of the left side. The total weight of the whole mass was 3 lb. It was a large solid mass, ovoid in shape, and subdivided by a constriction at the upper left-hand side into two tumours: (1) the larger (uterine) portion and (2) a kidney-shaped mass which was continuous in substance with the uterine portion at the upper part and apparently only adherent to it below. It is just possible that this smaller mass represented the ovary and tube of the left side invaded by the growth from the uterus. The uterine mass measured 15½ in. in circumference at its widest part, being 5¾ in. from above downwards and 5½ in. from side to side and 3 in. from before backwards. The smaller portion of the tumour measured 5 in. from above downwards and 2¾ in. from side to side. On section the uterine enlargement was found to be due to an enormous tumour situated in the anterior wall. The actual new growth measured 5 in. in diameter and was globular in shape, very soft in consistence, of a pale yellow putty-like appearance with numerous breaking-down and hæmorrhagic areas. This growth had flattened out the uterine cavity which lay behind it and was otherwise normal. It had also thinned out the wall of the uterus, which at its thickest part only measured $\frac{1}{2}$ in. and at its thinnest part $\frac{1}{8}$ in. The smaller tumour was separated from the larger only by a thin fibro-muscular layer. It presents similar features to the main mass, but is much more hæmorrhagic. From the surface of the fundus a small pedunculated tumour projected, apparently an extension of the growth through the wall of the uterus.

Histological Report.—Sections were cut from different parts of the main tumour, one from the smaller tumour, and one from the little pedunculated mass at the fundus. They all show a similar structure. The growth is composed almost entirely of cells of a connective tissue type arranged in an irregular manner in a minimal amount of delicate stroma. The cells are mainly small and spindle-shaped with large nuclei fairly rich in chromatin. They are sometimes arranged in definite bundles, but sometimes quite irregularly. There are numerous vessels which are extremely thin-walled and badly supported. In some cases the wall seems to be formed of only an endothelial layer supported by the actual cells of the tissue. There are frequent free hæmorrhages. The growth is a spindle-celled sarcoma. In the section of the smaller tumour no trace of Fallopian tube or ovary was found and the question whether this is an extension by means of the tube must remain unsettled.

The PRESIDENT (Dr. Amand Routh) asked if either of Dr. Handfield-Jones's patients had complained of paroxysmal pain. He had observed this symptom in several cases, the pain coming on daily at a definite hour and lasting two or three hours. A year ago he performed panhysterectomy on a patient of Dr. Watt Black's, aged 69. She had had a very large quiescent fibroid for many years, but for some weeks had suffered from metrorrhagia and offensive discharge. Exploratory dilatation of the uterine canal was effected, and a small curette brought away tissue from the fundal region, and this was stated by Dr. Lockyer to be sarcomatous in character. The patient did well and has had no recurrence. He had quite recently had a very similar case.

Report of the Pathology Committee.—" We have examined sections of the two specimens submitted by Dr. Handfield-Jones as 'Fibromyoma uteri undergoing sarcomatous degeneration' and are of opinion that both are specimens of spindle-celled sarcoma: the evidence of their origin from fibroids is wanting."

Chorionepithelioma following Hydatidiform Mole and giving rise to Intraperitoneal Hæmorrhage from an Extension in the Right Mesosalpinx.

By Thomas Wilson, M.D.

Apart from its occurrence in cases affecting the Fallopian tube, free hæmorrhage into the peritoneal cavity appears to be a rare occurrence in chorionepithelioma. No instance of the kind is included in Teacher's collection, and I have not hitherto met with a recorded case. In the instance here recorded the patient nearly died of internal hæmorrhage at an early stage of the disease, two months after the removal of a hydatidiform mole, and one month after the first symptom that could be referred to the chorionepithelioma. This formed a tumour the size of a walnut in the right fundus of the uterus, a small part of the mass projecting as a sessile, polypoid growth into the uterine cavity. The bleeding came from a small eroded surface on the back of the right mesosalpinx, and this surface was that of a small deposit of the growth apparently continuous with that in the uterine fundus. The diagnosis of the exact cause of the intraperitoneal hæmorrhage was obscure before operation; it was thought probable that extra-uterine gestation could be excluded, and that the bleeding might be from an ovary with lutein degeneration or lutein cyst, such as often accompanies hydatidiform mole or chorionepithelioma.

Mrs. D., aged 30, had been married for three years and borne one child, twenty-one months ago, after which she was ill with mammary abscesses and cystitis for three months. On November 29, 1912, she was first seen by me in consultation with my friend Dr. Stormont. Her catamenial periods had been regular until three months before, when she became pregnant and went on normally for two months. At the second month she was nursing her sick child when she was seized with bleeding, which has continued, more or less, ever since. There has been much vomiting, and five days ago there was severe uterine hæmorrhage and the patient was observed to be getting pale. For the last day or two there had been mild cramp-like lower abdominal pains, and on the morning of my visit there had been another smart flooding. The patient was thin and anæmic. The uterus was about as large as at four months of pregnancy, extending upwards to 2 in. below the umbilicus; its consistence on the whole was firm but more elastic in the lower part. The cervix was taken up and the external os just admitted the finger.

Under chloroform the cervix was dilated to 20 Hegar. Many black blood-clots were cleared out of the lower part of the uterus and a hydatid mole as large as the closed fist was evacuated by finger and ovum forceps. The uterus was well washed out with iodine solution and packed with iodoform gauze. The patient made a good recovery and everything went well until about January 1, when she began to have a little blood-stained discharge every day, and to complain of irritable bladder and some pains and heaviness in the pelvis. On January 19, there were sharp pains in the lower abdomen with diarrhœa. On January 22 another attack of severe pain lasted two hours and caused vomiting. From then until January 28, when the patient was brought to my rooms, there was pain on and off in the pelvis. On January 27, after emptying the bladder, there was severe pain which caused the patient to faint and lasted all day. In the last two or three weeks the patient has become thin and miserable and has looked ill.

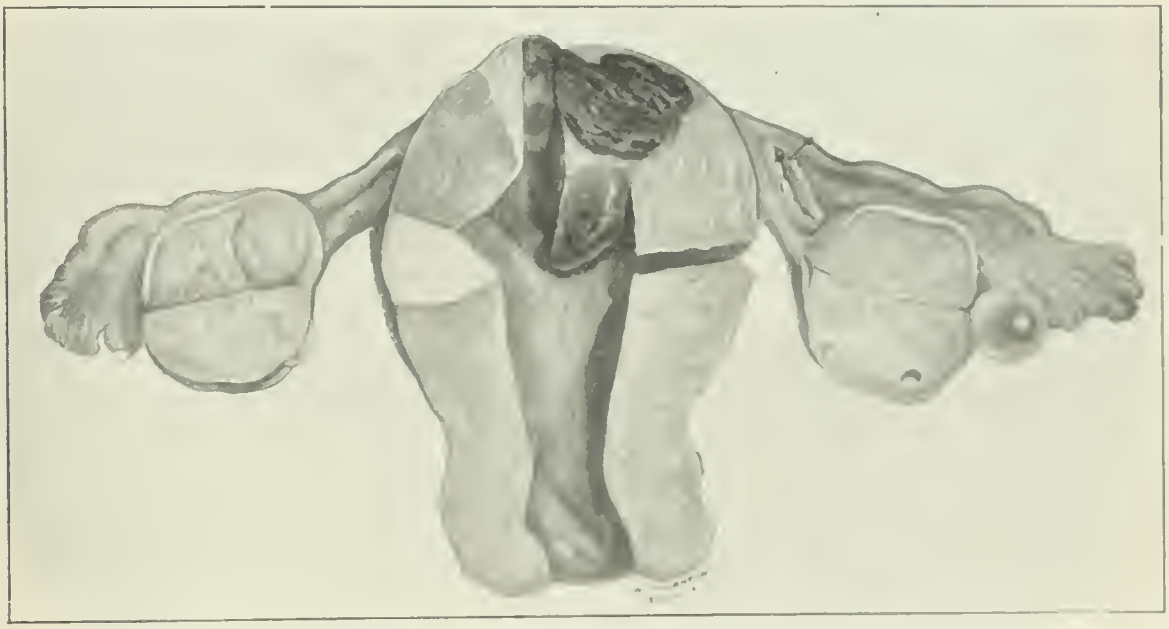


FIG. 1.

Case of chorionepithelioma. A nodule of chorionepithelioma is seen in the fundus of the uterus, and there is a sessile polypoid mass projecting into the cavity. The free intraperitoneal hæmorrhage came from the position marked by an arrow on the back of the right broad ligament. At the time of operation the breach of surface was much smaller than here depicted.

On her visit on January 28, she seemed fairly well on first coming into my room. After some conversation she went out to pass water and immediately after returning complained of severe pain in the lower abdomen, and then, in the course of two or three minutes, lost consciousness, became deathly pale with cold surface and shallow and infrequent breathing, and broke into a cold sweat. The pulse completely disappeared at the wrist; the heart sounds were barely audible, about fifty to the minute. After a hypodermic injection of strychnine and an enema of strong hot coffee the pulse began slowly to return, but was at first irregular. One and a half hours later it was 120, but the

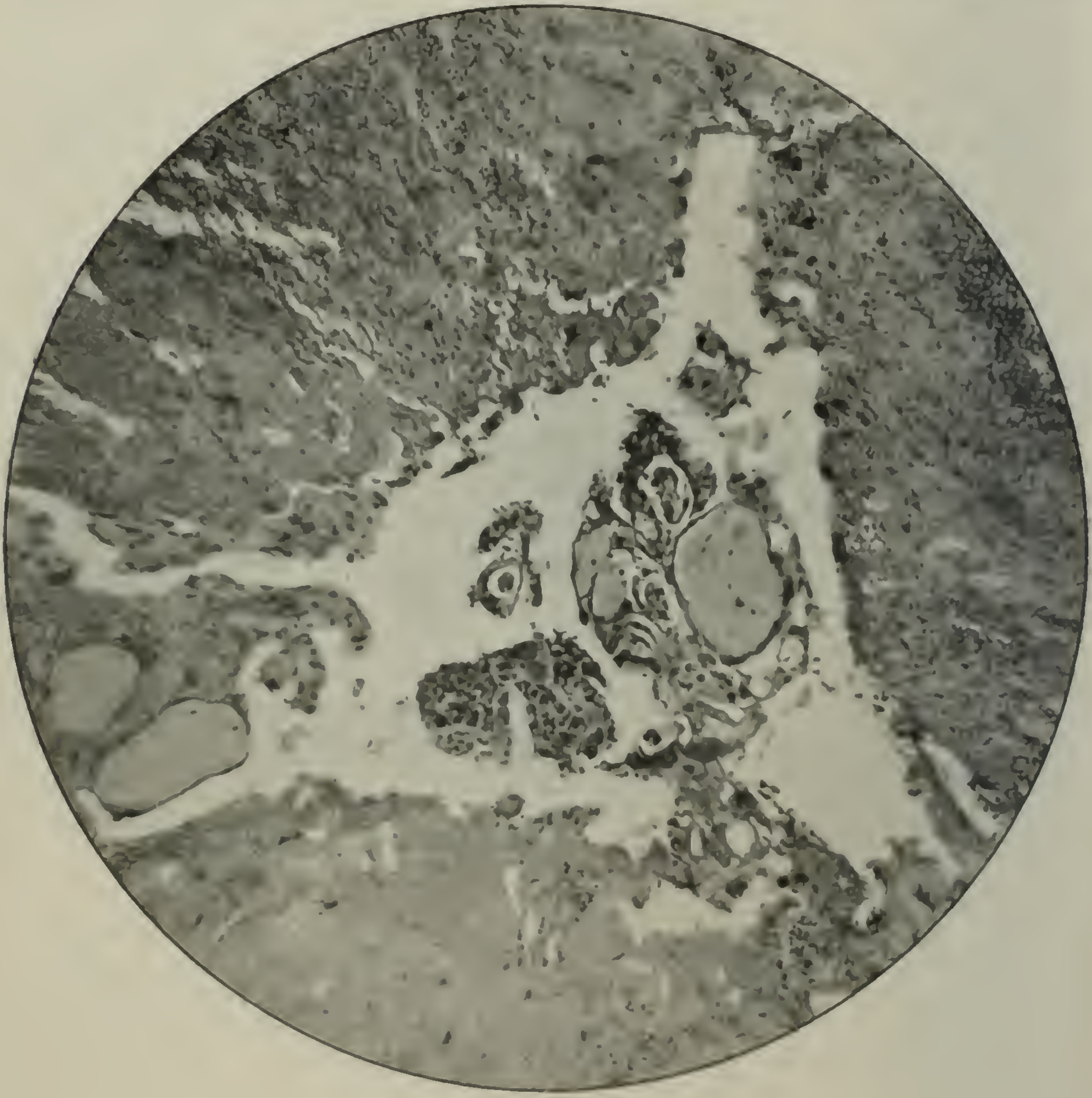


Fig. 2.

Small nodule of chorionepithelioma in midst of a mass of blood-clot; in the midst is seen a well-preserved chorionic villus.

patient was still very pale. On examination there was exquisite tenderness round the uterus and on pressing the uterus itself. From the right posterior part of the isthmus there was a small soft prominence, but nothing else could be made out. A hypodermic injection of $\frac{1}{3}$ gr. of morphia was administered and the patient admitted to private hospital.

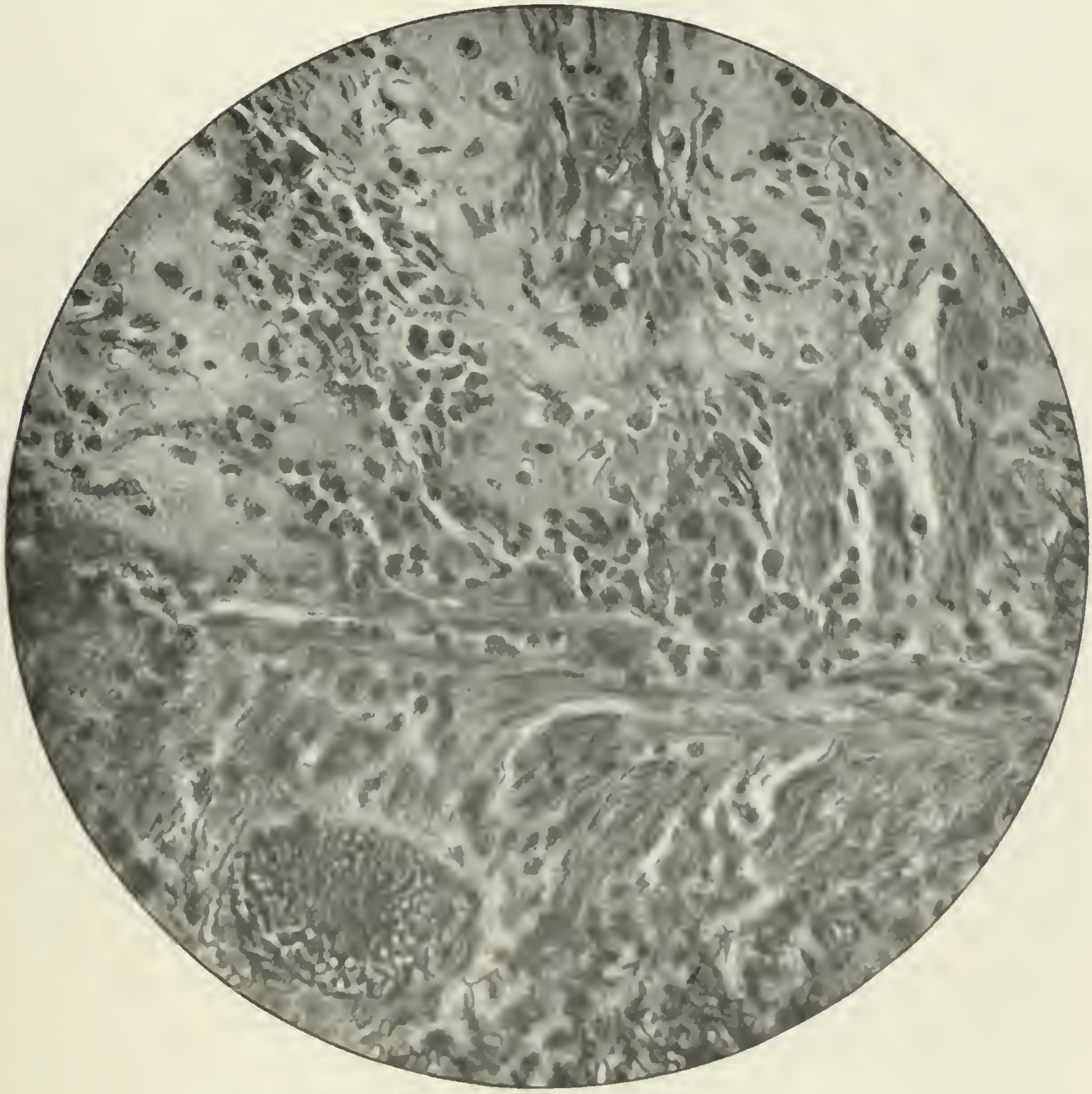


FIG. 3.

Portion of growth under a high power; from fundus of uterus.

On January 29, a suprapubic transverse fascial incision was made and a quantity of free red blood was found in the peritoneal cavity with a large dark clot behind the uterus; the quantity in all was estimated at at least 3 pints. Free bleeding was going on from a vein as large as the radial in a small eroded patch on the posterior surface of the right mesosalpinx. A rounded prominence in the right side of the fundus of the uterus with a large vein coursing over it looked like the wall of a cyst. The uterus was removed together with both sets of appendages and the incisions in the vagina and abdominal wall were closed without drainage. The patient made a smooth recovery and was discharged convalescent three weeks later.

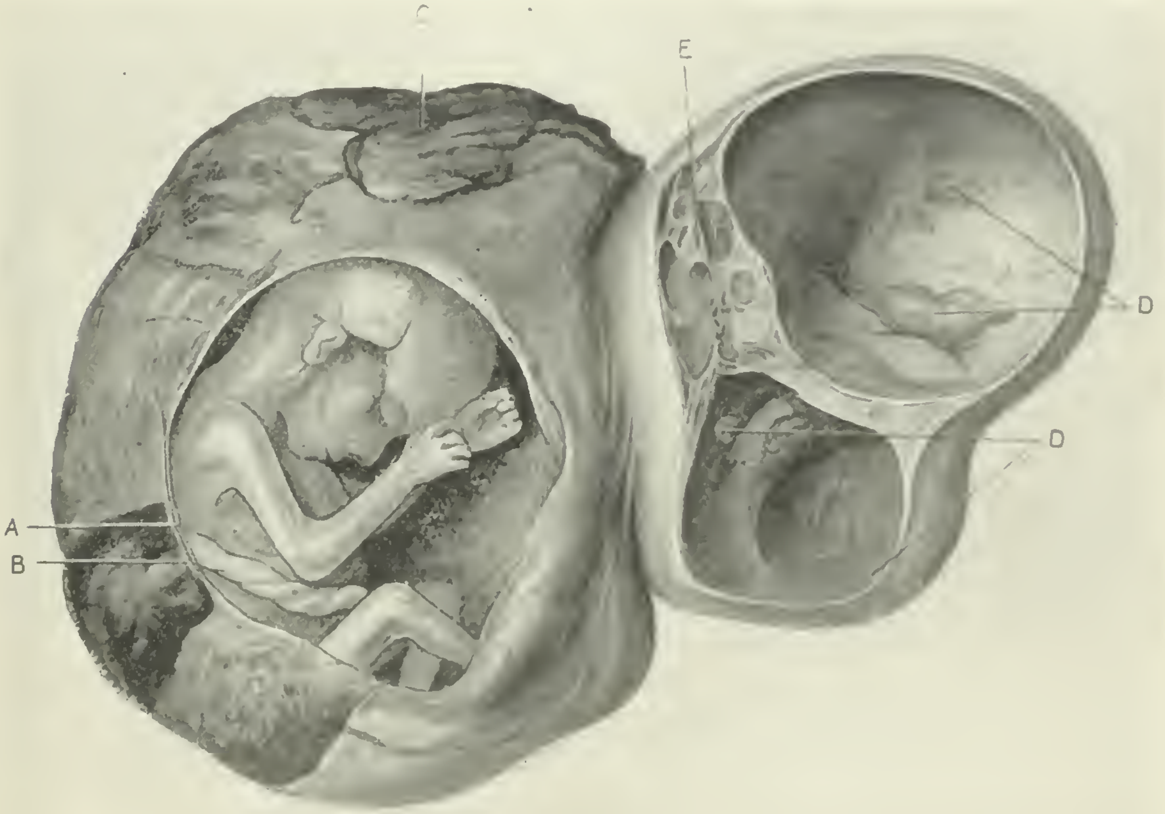
The parts removed were examined by Mr. Whitehouse, to whom I am indebted for the following account: The uterus measured 4 in. by 2½ in. by 2 in. The peritoneal surfaces are smooth and free from adhesions. In the right fundus is a rounded projection, which on section appears to be encapsuled, is dark red in colour from extravasated blood, is friable, and presents the typical appearances of chorionepithelioma. A small part of this mass projects as a sessile polypoid growth into the fundus of the uterine cavity near the right cornu; elsewhere the endometrium is smooth and normal in appearance. The Fallopian tubes are healthy. The ovaries contain no metastases; in the right one is a well-marked corpus luteum, and lutein tissue is also present in the left. On the posterior surface of the left mesosalpinx, near to the left cornu of the uterus, is a small nodule with an eroded surface from which the bleeding took place. The eroded surface forms a small ulcer ⅜ in. in length; at each end of the ulcer a small vessel is seen with its lumen occupied by blood-clot. The nodule extends into the mesosalpinx between the Fallopian tube and the ovarian ligament; it is friable and appears to be neoplastic and is directly continuous with the growth in the uterine fundus. Microscopic sections show the characteristic appearance of chorionepithelioma. Masses of large, oval, nucleated cells are seen invading the tissues; in close proximity are collections of small polygonal cells with darkly staining nuclei. In one section an atrophic chorionic villus is present, and the origin of the smaller polygonal cells from Langhans's layer is well shown. A considerable amount of diffuse hæmorrhage has taken place into the growth.

Report of the Pathology Committee.—"The Committee reported that an incision was made through the uterine wall between the growth in the mucosa and the edge of the rent in the mesosalpinx from which the bleeding occurred. The intervening muscular wall of the uterus appears perfectly healthy to the naked eye. There is, therefore, no evidence of continuity of growth, and we are of opinion that the chorionepitheliomatous elements seen in the blood-clot obtained from the site of rupture in the mesosalpinx are embolic."

A Primary Ovarian Pregnancy at the Fourth Month.

By Frederick J. McCann, F.R.C.S.

The majority of the authentic examples of ovarian pregnancy have been recognized in the early weeks of gestation, although as many as eleven cases are mentioned by Whitridge Williams as having gone to term. In order to prove that the pregnancy when advanced is ovarian it is necessary: (1) That the corresponding Fallopian tube be intact; (2) that the ovary on the same side be absent; (3) that the fœtal sac be connected with the uterus by the utero-ovarian ligament; (4) that ovarian tissue be discoverable in several portions of the sac wall. The



The drawing represents an anterior view of the specimen (× ⅔). A portion of the cyst wall has been removed as well as the anterior wall of the fœtal sac. A, the amniotic lining of the fœtal sac; B, the external fibrous layer; C, recent blood-clot—in this position the omentum was adherent; D, intracystic growths; E, small cystic cavities, some containing adenomatous growths.

macroscopic appearance and anatomical relations of the specimen to be described seem to place it beyond all doubt.

The specimen was obtained by abdominal section from a woman, aged 32, the mother of one child, aged 5½. She had been married eight and a half years, and no subsequent pregnancy had occurred. She menstruated regularly, and enjoyed good health until February 10, 1912, when her periods ceased. Soon afterwards she suffered at intervals from acute attacks of pain in the lower portion of the abdomen on the left side, and on one or two occasions vomiting also occurred. These attacks became more frequent, causing her to remain in bed, and for four weeks before admission into the Cray Valley Cottage Hospital she had remained entirely in bed.

On May 29, 1912, owing to increased abdominal pain and tenderness, she was admitted into the Hospital. A large swelling occupying the left half of the abdomen and extending above the level of the umbilicus was found on examination. It felt like a cyst, and was very tender. The uterus, slightly enlarged, was palpable in front and to the right. The tumour was thought to be either a cyst of the left ovary complicating an early pregnancy or an ectopic gestation.

I saw her on June 7 and decided to operate. Dr. Bennion, under whose care the patient was admitted, and to whom I am indebted for the notes of the case, kindly assisted me at the operation, whilst Dr. Bailey gave the anæsthetic. When the abdomen was opened the omentum which was adhering to the upper pole of the tumour presented that dusky colour suggestive of ectopic pregnancy, and some old blood-clot was seen at the lower part of the abdominal cavity on the left side. The tumour was found to be ovarian and connected to the uterus by the utero-ovarian ligament, and to the left broad ligament by the mesovarium. The left Fallopian tube was quite free from the tumour, and appeared to be normal in appearance. The cystic portion of the tumour was situated to the left, whilst that containing the fœtus was above and to the right. The omentum was separated carefully from the front of the tumour, and it was found that some recent hæmorrhage had occurred in this situation. As the fœtal sac wall was so thin care was necessary to prevent rupture during removal. The whole was brought out through the abdominal incision, only a slight recent adhesion to bowel requiring separation at its lower and posterior portion. The utero-ovarian ligament and mesovarium were clamped and divided, and the vessels subsequently ligatured. Owing to the thinness of the fœtal sac it was possible to feel the fœtus, and thinking I had to deal with an ovarian pregnancy I demonstrated the relationship of the tumour to Dr. Bennion and Dr. Bailey. The appendages on the right side were apparently normal. The abdominal wound was closed, and the subsequent recovery of the patient was uneventful.

Description of specimen: A multilocular ovarian cyst consisting of two loculi, together about 4 in. in their largest diameter. A septum, in the substance of which are small cystic cavities containing adenomatous growth, separates these loculi from a third cavity over 4 in. in long diameter, which contains a fœtus of about the fourth month with its placenta. The upper surface of the cavity is covered with a layer of recent blood-clot. The raw surface seen at the back of the specimen running between the loculi and the fœtal sac represents the line of division of the entire tumour. The utero-ovarian ligament was directly connected with the fœtal sac. The fœtal sac consists of an outer fibrous layer external to the amniotic lining, but where it is in apposition with the cystic portion of the tumour ovarian tissue is seen in the microscopical sections. The relationship of the pedicle to the tumour, and the fact that the utero-ovarian ligament was directly connected with the fœtal sac, prove the specimen to be an undoubted example of ovarian pregnancy. A functionally active portion of the left ovary must have become impregnated, and the growing ovum evidently formed a sac for itself in this situation. The specimen further demonstrates the possibility of ovarian pregnancy occurring in an ovary already the seat of cystic tumour.

Perforation of the Fundus Uteri—Post Abortum.

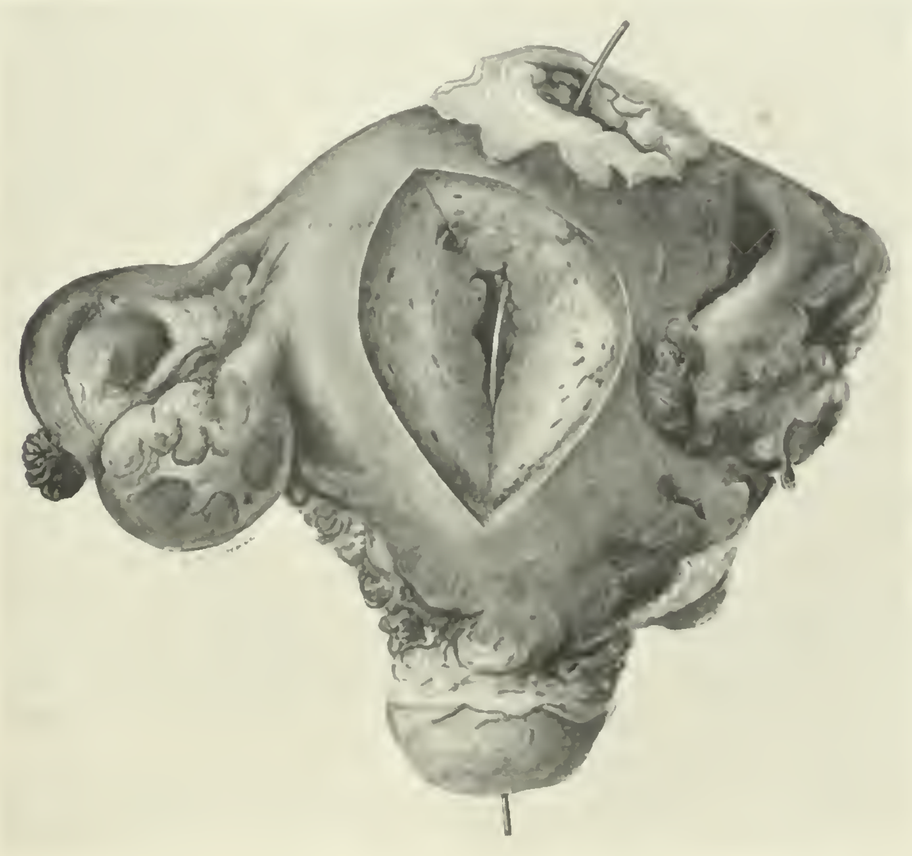
By Frederick J. McCann, F.R.C.S.

The following example of perforation of the uterine fundus after a miscarriage is of interest both from the clinical history and the subsequent course of the case. The patient, a woman aged 31, was seen by her medical attendant on December 11, 1912, and to him I am indebted for the following notes:—

"Called to see Mrs. B—— on Monday, December 11. Arrived in evening about 4.30, and learnt that she had had a miscarriage on the previous Saturday, that something 'formed' had come away. She thought that after-birth was still there. Temperature 102° F., pulse 110. Offensive vaginal discharge. Returned at 5.30; gave vaginal douche of perchloride; explored the uterus and with finger scraped away about half a teacupful of stinking material, friable, partly solid, of cheesy consistency, but mostly membranous. Washed out uterus with perchloride (1 in 2,000) and sent powder, quinine hydrochlor. 5 gr., and mixture—ext. ergotæ liq., 4 dr.; liq. strych. hyd., 40 minims; aq. ad. 6 oz.; ½ oz. t.d.s. On following morning found patient easier and less anxious-looking. Temperature 100° F., pulse 96; diaper a little blood-stained, but evidently nothing passed from uterus. Some herpes round mouth and nose (Lassar). Temperature and pulse remained about same until Saturday evening (December 19), when at 4 o'clock found patient very uneasy. Temperature 103° F., pulse 120. Half an hour later gave vaginal douche cyllin and attempted to explore uterus again, but found it firmly contracted and could not get through internal os. Gave intra-uterine douche of cyllin with Higginson syringe and glass uterine tube. Noticed after injecting about a pint that there was no return; thought must be distending uterus, so removed rubber of syringe but still got no return. Suddenly patient complained of intense pain in region of epigastrium and became very uneasy. Removed uterine tube. Patient appeared to collapse. Took pulse—90. Reassured patient, and then suggested hospital; sent for taxi and accompanied to Samaritan about 5 o'clock. I was using a large glass bent uterine tube. I do not think that I used sufficient direct force to penetrate uterine wall. What I imagined occurred was, in manipulating tube I obtained more leverage than I realized with rigid internal os as fulcrum and so tore through uterine wall in a lateral direction."

When seen by me after her admission into the Samaritan Hospital the patient exhibited obvious signs of general peritonitis. The abdomen was distended, rigid and tender; the pulse rapid and thready, and the facies Hippocratica well marked. I gave directions to have her prepared for an abdominal section and said I would return in two hours' time. On my return her condition had become much worse. The distension of the abdomen had increased markedly, the pulse was very rapid and feeble, and it was thought by the Sister-in-charge of the ward that she could not be removed to the operating theatre. I mention these facts to show the extreme gravity of her condition prior to operation.

The abdomen was opened in the middle line and a quantity of dirty-brown, evil-smelling fluid exuded from the wound. The intestines were distended and the peritoneum inflamed. On separating the coils of intestine a quantity of fluid smelling of cyllin escaped, and when the fundus uteri was exposed a perforation was noted in its centre. A rapid panhysterectomy was performed and the pelvis subsequently filled with gauze, a portion of which was brought through the vagina. A drainage-tube was inserted laterally in the flanks and one in the lower part of the abdominal incision. After closure of the abdominal incision the cavity was washed out with saline solution through the drainage-tubes. Her condition was somewhat improved after the operation. She was placed in the semi-erect posture and treated with continuous rectal saline infusion. The gauze was removed from the pelvis in forty-eight hours, and the drainage-tubes two days later. She continued to improve steadily and the abdominal wounds healed well. On the tenth day, however, she began to suffer from distressed breathing and on examination signs of broncho-pneumonia were detected. Her dyspnœa increased and she died on the twelfth day.



Uterus and appendages (posterior view). The uterine cavity has been opened from behind to show the thickening of the uterine walls. A bristle has been inserted into the cavity of the uterus and through the perforation in the fundus.

She was nursed with assiduous care by the Sister and nurses, to whom great credit must be given, and it was a disappointment to all concerned that her life could not be saved.

The occurrence of pulmonary complications in cases of general peritoneal infection is a subject of great clinical interest and importance. Whether infection spreads directly from the peritoneal cavity to the chest or whether the broncho-pneumonia is embolic in origin, is difficult to decide. The latter view is the more likely in the case under consideration, because of its late occurrence after the signs of peritoneal infection had subsided, and because of its more or less sudden onset. A post-mortem examination was not permitted, and for this reason the cause must remain unsettled.

Description of specimen: The specimen, as depicted in the accompanying illustration (posterior view), consisted of the uterus and its appendages, showing a large oval perforation 1¼ in. in long diameter on the posterior surface of the fundus behind and internal to the insertion of the right Fallopian tube. The orifice of the perforation was wide and the exposed surface of the uterine muscular coat covered with granulations, whilst a dense deposit of inflammatory lymph existed in the adjacent serous coat. A smaller perforation, about ½ in. in long diameter, passed through the serous coat close to the tube into the track of the larger perforation behind it. Part of the posterior wall has been removed in order to display the marked thickening of the uterine walls which were infiltrated with inflammatory products. A bristle has been passed through the perforation into the uterine cavity. The anterior surface of the uterus and the appendages were covered with inflammatory lymph; the fimbriated extremities of the tubes were unobstructed. Microscopic sections of the thickened uterine wall show it to be the seat of diffuse suppuration.

The condition of the tissues involved in the perforation would seem to indicate that the chief injury must have been inflicted during the digital scraping of the uterus six days before the injection passed through it and not at the time the injection was administered.

Dr. ANDREWS said that he had been called to two cases in which the uterus had been perforated by an intra-uterine douche nozzle. In one case about a pint of 1 in 2,000 perchloride of mercury solution had been pumped into the peritoneal cavity; in the other a pint and a half of weak lysol solution. In the first case the patient died within a few hours. The second patient recovered with no bad symptoms after the solution had been removed, although she had had a good deal of pain before. The treatment he had adopted consisted in an incision through the posterior fornix which allowed the fluid to escape, washing out the peritoneal cavity with a saline solution, and drainage *per vaginam*.

A Large Pancreatic Cyst simulating an Ovarian Tumour.

By Frederick J. McCann, F.R.C.S.

The patient, a woman, aged 31, three and a half months after her confinement at full term, was advised by her medical attendant to seek hospital treatment on account of an abdominal swelling which had remained after delivery. It had rapidly increased in size without causing pain, and was associated with some loss of flesh. She menstruated for the first time after her confinement on February 29, 1912. For three years she had suffered from indigestion and vomiting after food, and on one or two occasions dark blood was seen in the vomit. No history of trauma was obtained. A large, tense, fixed, painless cystic swelling was found occupying the greater part of the abdominal cavity, bulging towards the left side and reaching down into the pelvis. It scarcely moved with respiration, and was not definable towards the back. The uterus to which the swelling appeared to be closely connected was pushed to the right side, giving the impression that the cyst was ovarian in origin. The urine, specific gravity 1020, contained urates and a trace of albumin. The bowels were constipated, and micturition normal.

On March 7, 1912, the cyst was opened and drained through a median abdominal incision by another surgeon. A large quantity of glairy fluid escaped, which on examination was found to contain a digestive ferment. The cyst wall was sutured to the abdominal wall and the drainage maintained until March 26, when the tube was removed and the wound permitted to heal.

On December 2, 1912, she was admitted under my care on account of the rapid increase in size of the abdominal swelling—so rapid, indeed, that the patient was under the impression that "she was going to burst." Further, on account of the rapid increase in size of the tumour, she began to suffer from difficulty in breathing, but still no local pain was experienced. From the history of the case I was aware I had to deal with a pancreatic cyst, and on examination the physical signs were similar to those already detailed.

On the following day (December 3, 1912) the abdominal wall was freely incised in the middle line, and the cyst was discovered to be adherent to it at what must have been the seat of the puncture. The stomach was found to be above and in front of its upper dome-like extremity, whilst the transverse colon was displaced downwards towards the pelvis. The main portion of the tumour bulged forwards between these two segments of the alimentary tract. Large vessels coursed over the surface of the cyst, which from its fixation and relations was obviously retroperitoneal. The anterior coverings were divided and separated until the cyst wall was exposed. By keeping close to the latter and tying the vessels divided, the cyst was gradually enucleated. A large artery coursing over the upper and right lateral wall of the cyst was divided and doubly ligatured early in the operation, which doubtless had considerable effect in minimizing subsequent hæmorrhage. The base of the cyst was found to be attached to the head of the pancreas, and careful separation was required in this situation before the tumour was freed. After removal of the cyst the pancreas and adjacent portions of the aorta and inferior vena cava were laid bare. Numerous vessels along the greater curvature of the stomach required ligature as well as others situated at various points in the tumour bed. When hæmostasis was complete, the peritoneum was brought together to obliterate any dead spaces, and the abdominal wall subsequently closed. The patient had a remarkably smooth convalescence, and has remained well.

Description of specimen: The cyst, which was removed entire, was about the size of a football, and possessed an extremely thin wall. On looking into its interior through a circular opening made into it, a cyst about the size of an orange can be seen springing from its inner wall. The microscope shows that the cyst is lined with columnar epithelium and traces of pancreatic tissue are found in certain situations in the wall.

Pancreatic cysts usually give rise to characteristic signs. Developing under the rib margin on the left side they grow downwards, and as they increase in size the stomach and liver are pushed upwards, whilst the transverse colon is pushed downwards and its mesentery stretched. It is only, as in the present instance, when the cyst is of large size that it descends to the level of the genital organs. Their consistence is markedly cystic, and they can be mistaken for high-lying adherent ovarian cysts. The history of the patient, the growth of the tumour from above downwards, the fact that the most prominent portion of the swelling is in the region of the pancreas close to the navel, and above all the ability to palpate the internal genitalia apart from the tumour, should aid in settling the diagnosis.

Exploratory puncture is dangerous, and should not be recommended.

A Case of Extensive Rupture of the Utero-vaginal Junction with escape of the Placenta into the Peritoneal Cavity.

By J. Bright Banister, M.D.

I desire to read a short account of the above case to-night in order to obtain the views of the Section upon the treatment adopted.

The patient was in charge of one of the district midwives connected with Queen Charlotte's Hospital, was aged 35, and pregnant for the tenth time. Her previous labours had all been instrumental, and on four occasions the placenta was removed manually. Labour began on December 16 at 9 a.m., and progress was slow, although the pains appeared good. The presentation was a right occipito-posterior. After the second stage had been in progress two hours the extern resident medical officer was sent for, and found that the head was low in the vagina, but that the occiput had not rotated forwards. He applied forceps and delivered a stillborn child at 2 a.m. on December 17. Two hours later the placenta had not been delivered, and as a slight hæmorrhage was persisting, it was decided to complete the labour by manual delivery of the secundines. This was found difficult, and upon a second attempt it was discovered that the hand passed into the abdominal cavity.

When I saw the patient at 4.45 a.m. she was complaining of severe abdominal pain which was quite general. Her pulse was 130, but fairly strong, and there was a slight vaginal loss. The abdomen was very tender, but the uterus could be felt firmly contracted and freely movable. On vaginal examination the cervix was lacerated, and the hand passed through a large tear in the posterior vaginal vault into the peritoneal cavity. High in the vagina the cord was felt passing up into the left iliac region. Free hæmorrhage occurred during examination. After plugging the rent partially and the vagina more fully with gauze, I removed the patient to Queen Charlotte's Hospital, where Dr. Stabb kindly allowed me to continue the treatment. On opening the abdomen I found the cavity full of blood, and delivered the placenta from in front of the left kidney. After swabbing the blood away and drawing up the uterus, I found the peritoneum stripped from its posterior wall as high as the level of the internal os. The rent extended laterally over both utero-sacral folds into the para-rectal pouch on either side; while below it reached the lowest limit of the pouch of Douglas. Through this rent was protruding the whole of the cervix, lacerated, œdematous, and much bruised. It seemed that there were two courses open to me: (1) To partially suture the rent, leaving room for drainage; and (2) to remove the uterus. Having regard to the insanitary surroundings in which her labour had taken place, the bruised condition of the cervix, and the wide extent of the rupture, I decided upon the latter, and also as her general condition appeared good enough to warrant the more radical but safer operation. Accordingly I did a total hysterectomy, and afterwards drew together the anterior and posterior peritoneal layers by mattress sutures, passing a gauze drain into the vagina through the middle and deepest part of the tear. The abdomen was closed in layers, except where a tube was passed down to the pouch of Douglas.

The patient stood the operation well, but the first week of her convalescence was disturbed by a superficial infection of the abdominal wound and a marked gastro-intestinal toxæmia, the latter due, I take it, to the impossibility of efficient preparation before operation. She left hospital well on the twenty-fifth day.

The ætiology of the rupture is somewhat obscure. There seem to be three possibilities: (1) That it was spontaneous; (2) that it was caused during the forceps delivery; and (3) that it occurred owing to attempts being made to separate the cervix from the posterior vaginal vault under the impression that it was the placenta.

The resident medical officer is positive that no force was necessary either in rotation or in the application of the forceps, and also that no attempt was made to separate the placenta. The first examination after delivery of the child, he admits, revealed nothing to him, as he could not feel the cervix, but, on re-examining immediately after he found the rent. I therefore assume the rupture to have been spontaneous, and that it was secondary to a marked degree of pendulous abdomen, and probably a nipping of the anterior lip of the cervix between the head and the symphysis pubis, the net result being that the head was forced through the posterior vaginal fornix partially into the pouch of Douglas, whence the forceps rescued it.

The fact that the whole cervix protruded backwards through the rent explains the expulsion of the placenta into the abdominal cavity.

DISCUSSION.

Dr. HUBERT ROBERTS asked Dr. Banister if he could show the uterus to the Section after removal. Dr. Roberts had had the opportunity of examining the specimen at Queen Charlotte's Hospital and it struck him that the case was not one of rupture of the uterus but rather *rupture of the vagina*. Dr. Roberts thought that if the uterus was definitely "*suspect*" Dr. Banister was justified in his treatment, but it seemed quite possible after opening the abdomen and removing the placenta that if Dr. Banister had drained the peritoneal cavity through the opening in Douglas's pouch the uterus could have been preserved. Dr. Roberts did not in any way criticize Dr. Banister's treatment adversely, but suggested the above alternative, seeing that it was a case not of rupture of the uterus but of vaginal rupture into Douglas's pouch.

Dr. ANDREWS said that he did not wish to cavil at the treatment that had been adopted in this case, but Dr. Banister had asked for criticisms. Dr. Andrews considered that in most cases of rupture of the uterus, with escape of the whole or part of the ovum into the peritoneal cavity, hysterectomy was the best treatment, and Dr. Andrews had reported two cases in which he had carried out this treatment successfully, but in cases such as Dr. Banister's, in which the lesion was a rupture of the vagina and not of the uterus, the treatment that he usually adopted—in many cases with success—was drainage of the peritoneal cavity *per vaginam*, with, if necessary, insertion of a few sutures to prevent prolapse of intestine.

Dr. BLACKER had recently recorded a case of a very similar kind in which the tear, however, was in the anterior and not the posterior fornix. In that case it was interesting to note how much more extensive the damage was found to be when the abdomen was opened than on vaginal examination. He thought the best and most surgical procedure was to open the abdomen to see exactly what injury had been done to the attachments of the uterus and then either repair it by suturing or, better still in most cases, remove the uterus, a source of immediate danger and of ultimate possible trouble. He would like to call attention to the great advantages presented by intravenous ether anæsthesia in these cases, more particularly where there had been a good deal of hæmorrhage and the patient was markedly collapsed.

Dr. HERBERT SPENCER said his own publications on rupture of the uterus were ancient history, his cases having occurred about fourteen years ago. Since that time abdominal surgery and hysterectomy had undergone improvements, but whatever might be said for exploratory laparotomy, he was strongly opposed to hysterectomy as a routine method in cases of rupture of the uterus. He thought, however, that Dr. Banister had been right in removing the uterus in his case.

Dr. BANISTER, in reply to Dr. Roberts's criticism, admitted that the uterus itself, apart from the cervix, was uninjured, but referred to the reasons which had prompted a radical operation. He had little doubt that infection had occurred, but wished that a culture had been taken before operation in order to prove its presence. In reply to Dr. Andrews, the placenta was so far up in the abdominal cavity that there was considered to be great risk of wounding the intestine in dragging it downwards through the rent. The opening of the abdomen gave more direct knowledge of the condition present and allowed the easy delivery of the placenta. It appeared to be by far the more surgical course to adopt and did not offer any added risk to the patient.

The Arrangement and Distribution of the Nerves in certain Mammalian Ovaries.

By W. ABEL, M.D., and A. LOUISE MCILROY, M.D.

THE arrangement and distribution of the nerves in the ovary is a matter of considerable importance in connexion with the influence of the nervous system on the functions of the ovary. Up to the present time comparatively little work has been done in this subject, while the histological methods employed have not in all cases been the most reliable. It was, therefore, suggested to us by Professor Noël Paton that an investigation of the nerves of the ovary should be made, using the most recent and reliable of nerve stains, the silver nitrate method of Ramon y Cajal. Before describing the results of our investigation we give a very brief résumé of the literature on this subject.

LITERATURE.

The early writers, among whom are Luschka [6], Frankenhauser [2], and Waldeyer [13], describe the ovarian nerves generally as entering at the hilum and passing either along the blood-vessels or directly to the follicles. Elischer [1], who worked on the ovary of the rabbit, sheep, and cow, describes the distribution of the nerves in practically the same way, but points out that the nerves to the follicles pass into the membrana granulosa, and in some cases seem actually to enter into the cells of this structure.

Meyer [8], and Vedeler [11], who both worked on the human ovary, describe a rich nerve supply in the hilum and round the blood-vessels, but find no trace of follicular nerves.

Riese [10] worked on the human ovary as well as on the ovary of the cat, dog, rabbit, and sheep. In all the types he finds the arrangement of nerves to be the same. At the hilum the nerves, which are very plentiful, divide into two groups, one accompanying the blood-vessels while the other passes directly to the follicles. Round the follicles the nerves are concentrically arranged, while small branches pass into the membrana granulosa. In the parenchymatous zone small cells are found which closely resemble ganglion cells, but their exact significance is uncertain.

von Herff [4, 5] also describes the nerves in the human ovary in the same way as Riese. He recognizes cells in different parts of the organ which he considers are nervous in type, but he emphasizes the fact that they do not correspond with ganglion cells found elsewhere in the body.

Retzius [9] gives an account of the ovarian nerves in the cat. He finds that the nerves accompany the blood-vessels or pass directly to the follicles. The follicular nerves are located solely in the tunica intima or externa, and do not extend into the membrana granulosa.

de Vos [12] also describes the follicular nerves as lying outside the membrana granulosa.

von Gawronsky [3], who conducted an investigation on many types of the mammalian ovary, describes polygonal cells lying on the course of many of the nerve-trunks. These cells he considers to be a special form of ganglion cell. He also finds evidence that the follicular nerves pass into the membrana granulosa, but considers it doubtful whether they actually enter the cells of this structure.

Mandl [7] records the results of an investigation made on the ovary of the sheep, dog, cat, rabbit, and other mammals. He finds no evidence in favour of the view that the nerve-fibres enter the membrana granulosa of the follicles. He suggests that what other writers have taken for nerves in this position have simply been pigmented cells, or nerve-fibres passing over or under the follicles.

Winterhalter [16] describes a ganglion lying in the zona vasculosa of the human ovary. The suggestion is made that this ganglion may discharge some reflex function in connexion with ovulation.

von Winiwarter and Sainmont [15], and von Winiwarter [14], have contributed very complete descriptions of the nerve supply in the ovary. They find no evidence of nerve-fibres in the membrana granulosa, but they recognize and describe groups of small racquet-shaped cells in the ovarian tissue. These cells they consider are derived from the sympathetic system and are somewhat analogous to the chromaffine cells of the suprarenal. They have, therefore, designated them "phœochrome cells."

METHODS AND MATERIAL.

In this investigation, as already indicated, we used the silver nitrate method of Ramon y Cajal. There are several modifications of this method, but we found what is known as the first modification to be the most successful. It is carried out as follows: The tissue, which is divided into small blocks of from 2 to 4 mm., is placed for twenty-four hours in a bath of 65 per cent. alcohol with 0·75 per cent. ammonia, at a temperature of 32° C. . . . It is then transferred to a second bath of absolute alcohol with 0·75 per cent. ammonia for twenty-four hours at the same temperature. The tissue is then carefully washed in distilled water and placed in a 1 per cent. solution of silver nitrate and kept in the dark at 32° C., until it assumes a golden-brown colour. It is then washed in distilled water and transferred to the following developing solution. It is important to note that this manipulation must be done either in the dark or with a red light. Developing solution: Pyrogallic acid, 1 grm.; formalin, 5 c.c.; absolute alcohol, 10 c.c.; distilled water to 100 c.c. After the tissue has been twenty-four hours in this solution at a temperature of 32° C., it is washed in distilled water and then transferred to 50 per cent. alcohol and carried through the ordinary process of dehydration. This stain colours the nerve-fibres dark brown or black, while the rest of the tissue is bright yellow. The nerve-fibres alone are clearly defined, and for this reason many photographs made of sections stained in this way seem slightly blurred. The materials used by us were the ovary of the cat, dog and rabbit. The organs were removed from the animals some hours after death, as it is found to be better than using the tissues absolutely fresh.

RESULTS OF THIS INVESTIGATION.

In the three types of ovaries examined we find the arrangement and distribution of nerves to be practically the same, although for purposes of demonstration the ovary of the cat or dog is superior to that of the rabbit.

The nerve-fibres are found lying in great abundance at the hilum of the ovary, where they enter the organ in close association with the blood-vessels. They are arranged in leashes of parallel fibres which show on their course numerous small varicosities (fig. 1). In the ovarian tissue proper the nerves divide up into three sets, a vascular, a follicular, and an interstitial set.

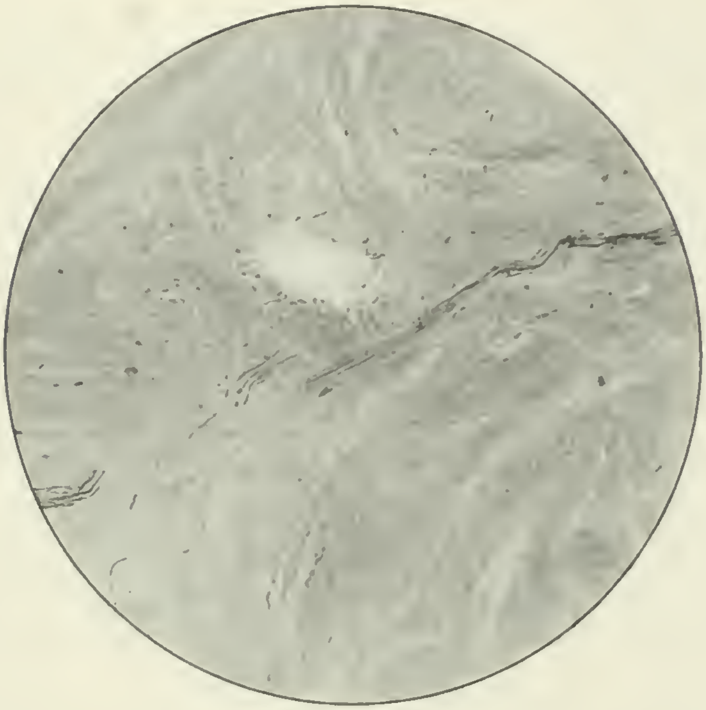


FIG. 1.

Section through a dog's ovary, showing a leash of nerve-fibres passing in from the hilum. (× 200.)

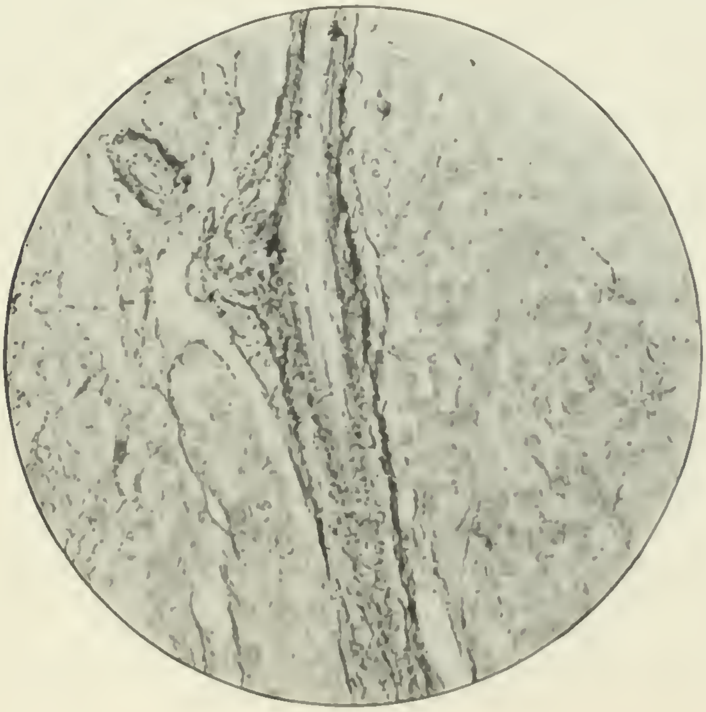


FIG. 2.

Section through a rabbit's ovary, showing a blood-vessel cut longitudinally and surrounded by a rich nerve plexus. (× 300.)

The vascular set of nerves accompany the blood-vessels. They are extremely numerous and form plexuses round the vessels and terminate in connexion with the endothelial or muscular coats of the vessel (fig. 2). Where the vessel is close to a follicle branches may be traced from the vascular nerves to the follicular plexus, in this way establishing a direct connexion between the two sets of nerves. The varicosities described on the nerve-fibres at the hilum are not prominent on the vascular nerves.

The follicular nerves pass directly from the hilum to the follicular zone. The fibres take a more or less direct course to the follicles but diverge just as they reach a follicle and become concentrically arranged. The follicular nerves are extremely fine in calibre and are not so numerous as the vascular nerves. Round the follicles the nerves show well-marked varicosities and form a very rich plexus in the tunicæ intima and externa. No nerve-fibres pass into the membrana granulosa (fig. 3).

The interstitial nerves, as the name implies, lie in the interstitial tissue of the ovary. They are the least numerous of the three sets, but are yet fairly abundant. On the course of their fibres are numerous varicosities, while at different points groups of very small cells are seen. These cells are arranged in groups of from eight to twenty, and lie frequently in the neighbourhood of a blood-vessel (fig. 4). In shape they are oval or racquet-shaped with clearly defined nuclei, and correspond very closely with an ordinary ganglion cell, except in their size, which is much too small. Delicate outgrowths seem to pass outwards from them, but their size is so minute that it is difficult to speak with certainty on this point. A rich plexiform arrangement is always seen round those cells, and where they lie close to a blood-vessel or follicle branches are sent from the vascular or follicular plexuses to join this interstitial plexus. In this way there is a linking up of the three sets of nerves in addition to the connexion described between the vascular and follicular nerves.

It is evident, therefore, that the ovary is extremely well supplied with nerves which are distributed most plentifully to the blood-vessels, although both the follicles and interstitial tissue are well supplied. The three sets anastomose and, therefore, can react on one another.

DISCUSSION.

From our investigation of the nerve supply of the ovary we find no indication that the nerves to the follicles pass into the membrana

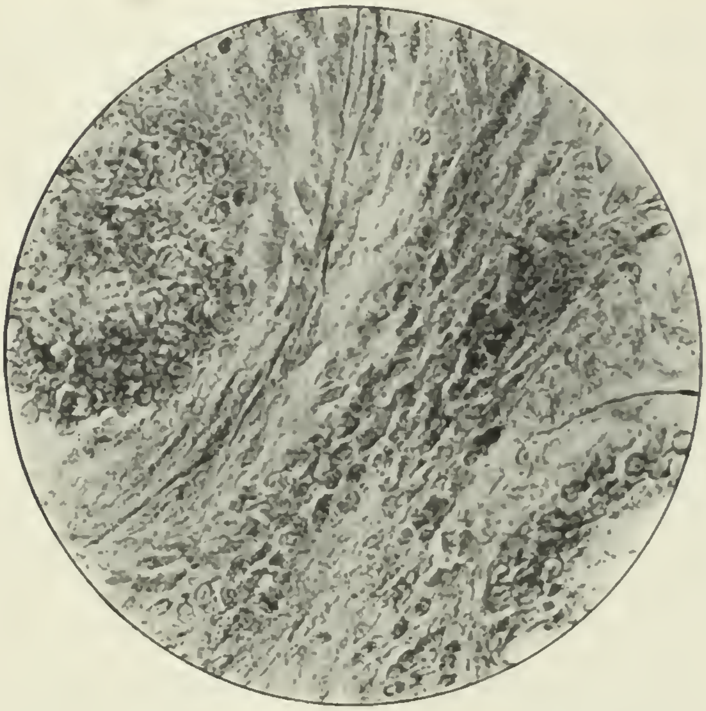


Fig. 3.

Section through a dog's ovary, showing the nerve-fibres lying in the tunicæ intima and externa of the follicles. (× 400.)

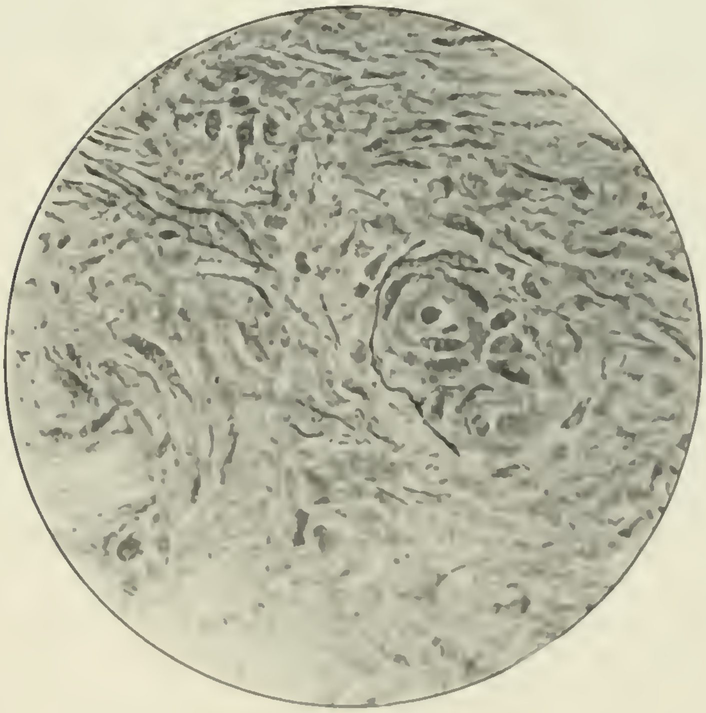


Fig. 4.

Section through the ovary of a cat, showing the nerve fibres in the interstitial tissue and also a small group of cells in connexion with those fibres. (× 800.)

granulosa. In this point we agree with the latest workers on this subject. It is, however, evident that by the use of a metallic stain, such as the Golgi method, used by Riese [10] appearances may be got in the membrana granulosa strongly suggestive of nerve-fibres. These appearances in thin sections are due to the delicate deposit of the metal between the cells. The advantage of the silver nitrate method is that such a mistake cannot be made, since the colour of deposited stain is quite different from that of stained nerve tissue.

The cells which we describe in the ovarian tissue are, we consider, homologous with those described by von Winiwarter and Sainmont [15], and by von Winiwarter [14]. They correspond in all points except in size with ganglion cells, and as they are undoubtedly nervous in structure it seems at least highly probable that they represent a modified form of sympathetic cell, more especially as the ovarian nerves are derived from the sympathetic system. We would point out that the cells described by us in the ovary do not correspond in any way with the ganglion cells described by Winterhalter [16]. We find no evidence of any ganglion cells of the ordinary type in the ovary.

As regards the function of the nerves in the ovary, their close association with the blood-vessels and the follicles indicates that they influence the blood-pressure and thus affect the follicles. What is the exact significance of the varicosities on the course of the nerve-fibres is as yet uncertain.

SUMMARY.

The results of this investigation may be briefly summarized as follows:—

(1) The ovary in the cat, dog, and rabbit is richly supplied with nerves which enter at the hilum.

(2) In the ovarian tissue the nerves are divided into three sets, a vascular, a follicular, and an interstitial set, which all anastomose.

(3) On the course of the nerves numerous varicosities are found, while groups of very small cells are found in connexion with the interstitial set.

(4) The follicular nerves lie in the tunicæ intima and externa and do not pass into the membrana granulosa.

(5) The function of the ovarian nerves is primarily vasomotor.

N.B.—The histological work was carried out in the Physiological Research Department, Glasgow University, and the expenses were defrayed by a grant from the Carnegie Trust of Scotland.

REFERENCES.

[1] Elischer. *Centralbl. d. med. Wissenschaften*, Berl., 1876, xiv, p. 884.
[2] Frankenhauser. "Die Nerven der Gebärmutter," Jena, 1867.
[3] von Gawronsky. *Arch. f. Gyn.*, Berl., 1894, xlvii, pp. 271-83.
[4] von Herff. *Centralbl. f. Gyn.*, Leipz., 1895, xix, p. 126.
[5] *Idem. Arch. f. Gyn.*, 1896, li, pp. 374-88.
[6] Luschka. "Anatomie des Menschen," Bd. ii, Abth. 2. (Das Becken), Tubingen, 1864.
[7] Mandl. *Arch. f. Gyn.*, 1895, xlviii, pp. 376-92.
[8] Meyer. *Arch. f. Gyn.*, 1884, xxiii, pp. 226-75.
[9] Retzius. "Biologische Untersuchungen," Stockholm, 1893, Bd. v.
[10] Riese. *Anat. Anzeiger*, Jena, 1891, vi, p. 401.
[11] Vedeler. *Norsk. Mag. f. Laegevidensk.*, Christiania, 1890, 4 R., v, p. 523.
[12] de Vos. *Bull. Acad. d. Med. Belg.*, Brux., 1894, 4 S., viii, p. 552.
[13] Waldeyer. "Eierstock und Ei," Leipz., 1870.
[14] von Winiwarter. *Arch. de Biol.*, Liége and Par., 1910-11, xxv, pp. 683-756.
[15] von Winiwarter and Sainmont. *Arch. de Biol.*, 1908-09, xxiv, pp. 627, 707.
[16] Winterhalter. *Arch. f. Gyn.*, 1896, li, p. 49.

A Case of Chorionepithelioma of the Fallopian Tube, following Extra-uterine Gestation.

By V. Zachary Cope, M.D., and E. H. Kettle, M.D.

It is rare for chorionepithelioma to occur primarily in any part other than the uterus, though secondary deposits in the vagina have often first called attention to the disease. The following case may, therefore, prove interesting on account of its rarity and clinical interest.

Case Details.

Mrs. S., aged 45. Previous history: Had borne two children. First child born in 1904, and is still living. Second child born in 1906—died seventeen days after birth. In 1908 patient was in bed for eleven weeks for what her doctor said was a fleshy mole. Menstruation always a little irregular.

Present illness: Normal periods said to have occurred in October and November, 1911. On December 1 of that year, early in the morning, she complained of abdominal pains, which suddenly became very acute, causing her to vomit and faint. Dr. Hunter Dunn was hastily summoned, and found her unconscious on the floor with a very weak, rapid pulse. She had passed urine involuntarily. The abdomen was rigid, especially on the left side. Morphia was administered and her condition improved, though rigidity and pain continued. Tenesmus was present. By vaginal examination Dr. Dunn found the uterus about normal size, but there was an indefinite painful swelling in the left fornix. The rectum was ballooned and a tender swelling was felt high up. Constipation was marked, but was relieved by enemata and castor-oil. The abdominal pain gradually subsided. She remained in bed for three weeks. On January 2, 1912, a small swelling could still be felt on the left side of the pelvis. Her condition remained fairly satisfactory, save that constipation became more severe. On May 31, 1912, she consulted Dr. Dunn again for constipation and vomiting; and on June 1 she was admitted to St. Mary's Hospital with a diagnosis of intestinal obstruction of doubtful origin.

On admission to hospital she had a pale, earthy complexion, and presented the signs of subacute intestinal obstruction—i.e., constipation, vomiting, and abdominal distension. A large tumour was felt in the lower abdomen, reaching up to the umbilicus and more marked on the left side. She informed me that no regular menstruation had occurred since December, 1911 (six months previous), but that some greenish fluid had come away *per vaginam* in April, 1912. This history, taken in conjunction with the previous illness, led me to diagnose ectopic gestation, probably still developing. By the administration of enemata the obstruction was partly overcome and the vomiting ceased, but the tumour remained. A few days later my colleague, Mr. Clayton-Greene (to whom I am indebted for permission to publish the case), performed abdominal section, and discovered a large mass filling the pelvis and looking like semi-organized blood-clot. It appeared to him, and to all those present, to be an old hæmatocele undergoing organization. The mass was removed piecemeal; hæmorrhage was free, but controlled by gauze packing. The tumour evidently took origin from the right side of the pelvis, and no trace of the Fallopian tube on that side was discovered. The abdomen was sewn up without drainage.

For a fortnight the patient's condition remained satisfactory. The abdominal wound healed by first intention, and no untoward symptoms developed. At the end of the third week, just before her anticipated discharge from hospital, she began to complain of pain in the right iliac fossa. Palpation revealed a tender, firm mass in the region of the cæcum. The temperature was elevated, and when, in the absence of my colleague, I was asked to see her I formed the opinion that an abscess was present. An anæsthetic was administered, and I opened the abdomen by Battle's incision. Immediately there came into view a dark red mass lying amidst the intestines between the cæcum and the right brim of the true pelvis. Stretched over the upper part of the red mass was a flimsy curtain of adherent omentum; the lower part was continuous with similar substance in the right half of the pelvis. The possibility of clot formation owing to the slipping of a ligature first arose, but the time-interval since the primary operation was too long, and the clot was rather too firm for any recent hæmorrhage. It was at this juncture that the house surgeon mentioned that the material removed at the first operation was reported by the pathologist to be somewhat resembling chorionepithelioma; when this possibility was mentioned it at once made the diagnosis clear. I inserted my finger into the tumour mass; the central part proved to be quite soft and some sanious fluid escaped. I removed some of the firmer portions of neoplastic tissue. It was of the consistency of placenta, though more friable, and was interspersed with whitish patches. On removing some of the tumour the hæmorrhage was exceedingly great, and difficulty was experienced in staying the flow, since the mass was in the midst of intestines which formed too soft a background for efficient plugging. It was controlled at last, and an intravenous saline injection was given. The patient did not survive more than a few hours after the operation. Since Dr. Kettle will describe the pathological findings, I will only state here that both microscopical and macroscopical post-mortem investigations confirmed the diagnosis of chorionepithelioma. The uterus and vagina were normal, and since portions of normal ovarian tissue were found in the midst of the material removed at the first operation, whilst the only traces of Fallopian tube on that side were scattered bundles of muscular fibres seen under the microscope, there seems little doubt that this was a case of tubal chorionepithelioma. The patient's previous illness was almost certainly due to a ruptured early tubal gestation.

I have submitted some of Dr. Kettle's sections to Professor Teacher, who kindly examined them and unhesitatingly confirmed our opinion of their chorionepitheliomatous nature.

Comments.

In May, 1912, Jeanneret was able to collect eleven cases of chorionepithelioma of the Fallopian tube, including his own case. In this collection he failed to include Miles Phillips's case, which was published in 1911. Jeanneret excluded a case recorded by Albert because no microscopical examination was published. If this latter be included our communication brings the published number of cases up to fourteen. In some instances it is difficult to tell whether the tumour was primary in the tube or in the ovary, but most of the above cases showed definite evidence of origin from the Fallopian tube. Up to the present four cases of chorionepithelioma of the ovary have been published; these were fully discussed by Fairbairn in a paper published three years ago.

The *average age* of the fourteen patients, who were the subjects of chorionepithelioma of the Fallopian tube, was thirty years. It cannot be stated that any marked predilection for the earlier or later years of the child-bearing period was evident. The previous menstrual history is imperfectly recorded in most of the published accounts. Gebhard's patient had given birth to a normal child three years previously. In Hinz's case normal confinements had taken place five and a half, four, and three years previously, and two miscarriages close together two years before the onset of the recorded illness. In Miles Phillips's account it is stated that the patient had borne three children, the last child being born twelve months prior to the onset of abnormal symptoms. Vieting mentions that his patient had three normal confinements and then a two and a half months' abortion three years before onset of fatal illness. In our case the history is very suggestive. First a normal child, followed two years later by an infant which died seventeen days after birth: then another interval of two years before a fleshy mole was expelled. Four years later the illness that we have recorded ensued. It would appear from the above facts that in some cases there occurs a gradual waning vitality of the genital cells, which culminates in a malignant change of the fertilized ovum.

The *symptoms* of the condition are such that it has never yet been correctly diagnosed before operation. The main symptoms are hypogastric pain, irregular hæmorrhage, anæmia, and rapid wasting. In half the cases the indications pointed to an extra-uterine gestation with tubal abortion or formation of a hæmatocele. Amenorrhœa, followed by abdominal pains, fainting attacks and irregular hæmorrhages from the uterus, are sufficiently suggestive. These alarming symptoms subside, and after a few months a large abdominal tumour is discovered. In the majority of cases, therefore, Jeanneret's description holds good. He states, "The history generally shows three characteristic stages—first, the symptoms of extra-uterine gestation; secondly, a latent period; thirdly, the stage of rapid development of the tumour accompanied by abdominal pains and wasting." To that type our case conforms, but in several of the recorded cases diagnosis of some abnormal pelvic condition was compelled before the disease had progressed sufficiently to form a well marked tumour. Pyosalpinx, salpingo-oöphoritis and ovarian cyst have been some of the diagnoses made. In two cases (Marchand and Gebhard) a vaginal nodule was discovered early, and in Thorn's case a vaginal metastasis was found at autopsy. Vaginal metastases appear to be less frequent than is the case with uterine chorionepithelioma. In one case the patient died with marked cerebral symptoms. In Miles Phillips's case hæmoptysis at one time occurred, yet recovery took place. In our case symptoms of intestinal obstruction caused by the large tumour filling the pelvis were marked. Bleeding from the rectum owing to ulceration of the growth into the bowel occurred in Jeanneret's case; and in our case the growth had penetrated to the submucous tissue of the pelvic colon.

Position of the Tumour.—In three cases where the disease was found in a comparatively early stage the tumour was situated at the juncture of the Fallopian tube with the uterus; in most cases the exact site of origin was difficult to determine, but a mass was found filling the pouch of Douglas, and adherent to neighbouring intestine and omentum.

Operations.—If the tumour is found early it might be removed in the same way as a tubal mole or abortion, which it closely resembles. But in those instances where general adhesions have been contracted it is usually impossible to remove the tumour entire, for it is so friable that it breaks on manipulation. This necessitates removal by morcellement. Unless this is done thoroughly local recurrence ensues, and such recurrence is apt to be exceedingly malignant. In our case three weeks' growth was represented by a mass filling the right side of the pelvis, and occupying the right iliac fossa, in addition to large nodules which had almost eaten through the sigmoid colon. Such rapid growth is amazing.

The cause of death is either profound anæmia and asthenia, the effect of secondary growths on vital parts of the body, or hæmorrhage at the time of operation. This hæmorrhage may be very great. In the case we have recorded here bleeding at the first operation was fairly easily controlled, but at the second the hæmorrhage was profuse, and was with the greatest difficulty stopped by means of gauze plugging.

The *prognosis* of chorionepithelioma of the Fallopian tube is very grave. Out of the fourteen cases only two recovered, and one of these (Albert's case) is not accepted by all authorities, since the record is imperfect. There is no doubt, however, about the recovery which took place in Miles Phillips's patient. Sufficient notice has not been taken of this remarkable case. The patient was reported to be well more than three years after the second operation at which total hysterectomy was performed for local recurrence; at the operation an inoperable tumour was observed at the root of the mesentery. It would appear that recovery may occur in spite of some of the growth being left.

From the clinical aspect I would like to offer the following conclusions:—

(1) Chorionepithelioma of the Fallopian tube has no special age of incidence.

(2) It is sometimes accompanied by a previous history suggestive of a waning vitality of the fertilized ova.

(3) The symptoms are usually those of tubal gestation followed after a period of quiescence by tumour formation and wasting. In a minority of cases uterine hæmorrhage and hypogastric pain may be all that is noticed.

(4) Sometimes a vaginal nodule first calls attention to the condition.

(5) In any suspected case abdominal section is to be advised.

(6) All tubal gestations which have been operated on should be carefully watched for a considerable period after operation.

(7) If the growth is at the angle of the uterus hysterectomy is advisable.

(8) The prognosis is unfavourable, but can never be given with certainty because recovery has taken place even when secondary deposits have formed.

(9) The origin of the tumour is from the perverted growth of the chorionic villi in a tubal mole.

PATHOLOGICAL REPORT.

The pathological diagnosis is based upon the examination of the operative material (the primary tumour and the small pieces removed at the second exploration), and the results of the autopsy.

The primary growth consisted of fragments of hæmorrhagic tissue closely mixed with masses of blood-clot; no distinct organs or parts of organs could be distinguished. Here and there could be seen small areas of soft, white tissue which seemed to be invading the more solid fragments, but nothing very definite was to be made out. Similar pieces of tissue were received from the second operation. The post-mortem picture is more complete, the findings being as follows:—

The body was that of a well-nourished woman; there were recent operation wounds in the abdomen. On opening the peritoneal cavity a large quantity of deeply blood-stained fluid, together with small clots, escaped. On the right side of the abdomen there was a large mass consisting of blood-clot internally, with a thin outer layer of whitish, hæmorrhagic friable growth, the whole being bounded by coils of small intestine. A few small, hæmorrhagic nodules were scattered over the mesentery, and two were present in the wall of the intestine. One of these intestinal tumours was the size of a hen's egg, and was situated in a coil of the small gut which was adherent to the rectum and the fundus of the uterus; the other, considerably larger, was found in the pelvic colon. Both were extremely hæmorrhagic, presenting scarcely any solid growth, and both were limited to the outer wall of the bowel. The right ovary and tube, together with a small part of the fundus of the uterus, had been removed at the first operation. There was much hæmorrhage into the surrounding tissues, and the right pelvic wall was slightly infiltrated by friable, hæmorrhagic growth. Except for the

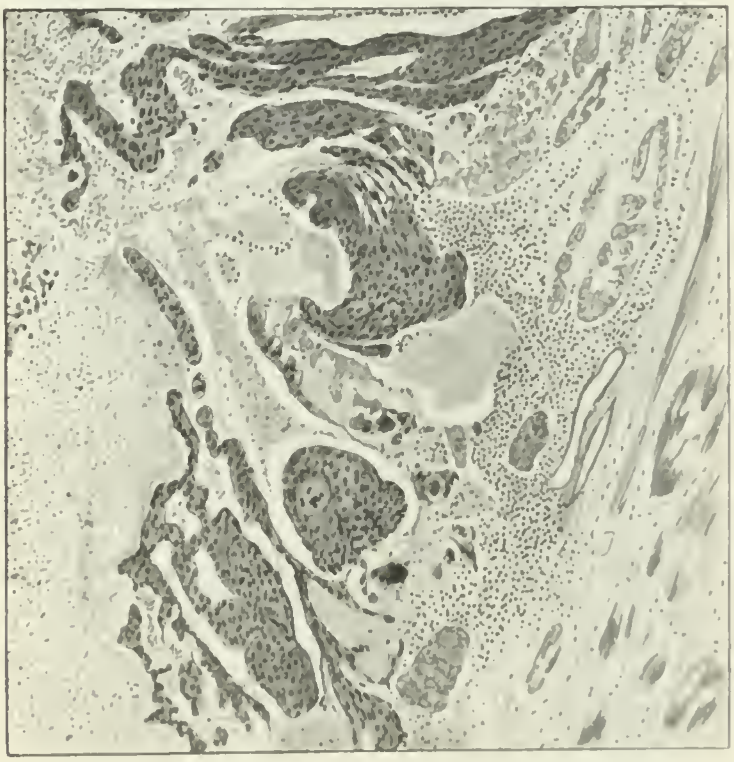


FIG. 1.

Columns of growth, consisting of Langhans's cells and syncytium, invading the uterine wall from without.

wound in the outer wall at the fundus, the uterus showed no change, and the left tube and ovary, and the vagina were all perfectly healthy. There was no recent corpus luteum in the ovary. The liver was soft and fatty, and contained in the right lateral lobe a small hæmorrhagic nodule, apparently a metastatic deposit. No other growths were found in the abdomen, the remaining organs and the lymphatic glands being perfectly normal. The lungs were pale and dry. In the right upper-

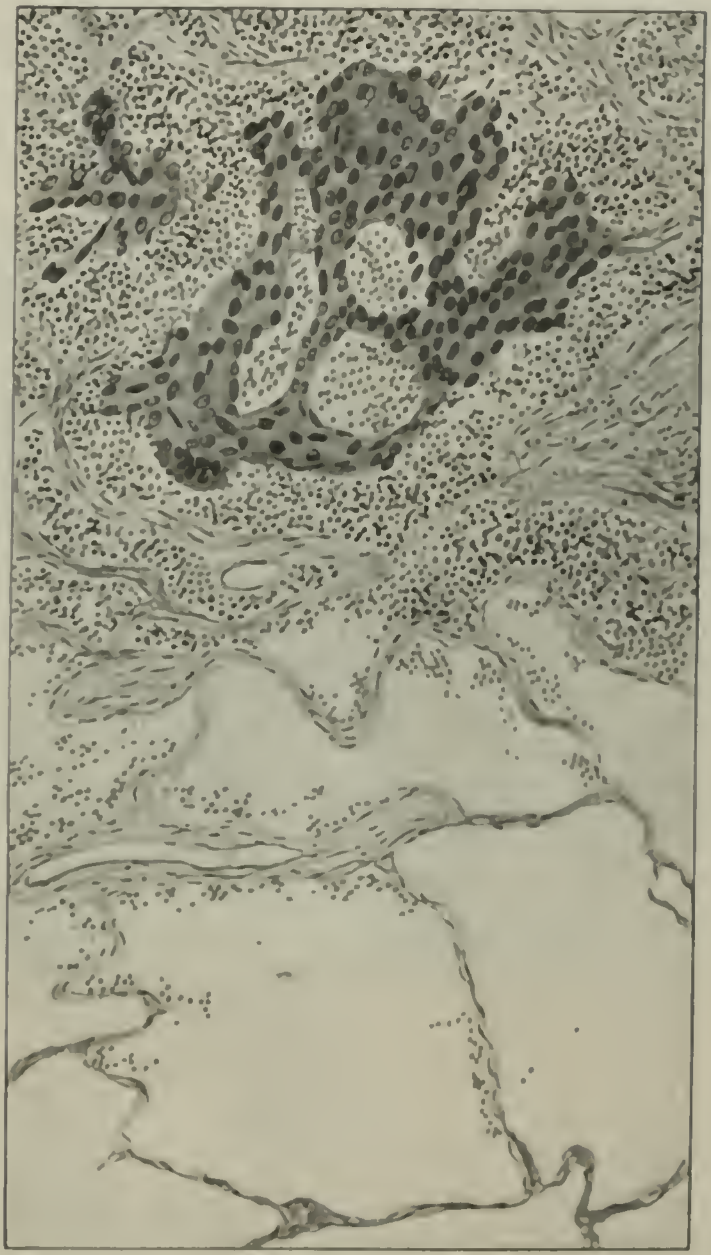


FIG. 2.

Metastasis in the lung.

most lobe there were about ten hæmorrhagic, wedge-shaped, or globular areas, all small and superficial; some contained a little whitish tissue resembling the abdominal growths. Two or three similar nodules were present in the lower lobes on the right side, and two were found in the left upper lobe. The thoracic lymphatics were normal. The heart was moderately dilated.

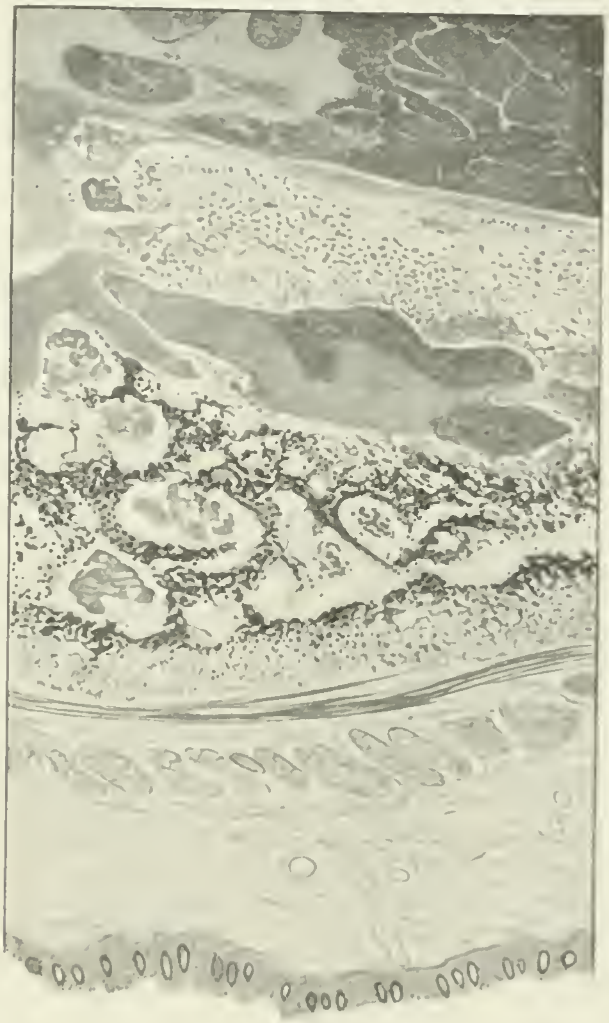


Fig. 3.

Peritoneal deposit invading the outer coats of the sigmoid colon.

For histological examination the tissues from the operation and the post-mortem were fixed in formol salt solution or Zenker's fluid, embedded in paraffin and stained with hæmatoxylin and eosin or iron hæmotoxylin and van Gieson. The sections from the operations include portions of the uterine wall, the right ovary and the right Fallopian tube, and the peritoneal deposits. At the post-mortem sections were taken from the peritoneum, the intestinal deposits (fig. 3), and the

TABLE OF CASES OF CHORIONEPITHELIOMA OF FALLOPIAN TUBE.

Case	Reported by	Date	Patient's age	Symptoms	Operation	Result	Post-mortem finding	Remarks
1	Marchand	1895	17	Profuse uterine hæmorrhage; nodule in vagina	Vaginal nodule removed	Recurred; death in six months from onset of symptoms	Tumour in left Fallopian tube size of a duck's egg; only vaginal metastasis; peritonitis	Typical chorionepithelioma; many small cysts in both ovaries
2	Snegirew	1895	25	Abdominal pains; fainting attacks; rapid wasting; diagnosis of hæmatocele	Removal of tumour of left tube (size of an apple) by morcellement; adherent to neighbouring organs	Death	—	Typical chorionepithelioma
3	Nikiforoff	1896	34	Ectopic gestation diagnosed; then seven months' interval; then rapid increase in size of swelling in left side of pelvis	Removal of tumour size of child's head by morcellement	Death four months later	Metastases in liver and lungs	Typical chorionepithelioma
4	Thorn	1896	29	Symptoms of left sided tubal gestation	Removal of tumour size of small apple	Death two months later	Metastases in vagina and lungs	Thought to be sarcoma at first; later recognized as chorionepithelioma
5	Gebhard	1897	26	Two months' amenorrhœa; then four months' bleeding; vaginal nodule; bladder pains; uterus displaced back and to left, slightly enlarged	Removal of vaginal nodule	Death	Metastases in spine, vagina, lungs and spleen; tumour (size of an apple) in the Fallopian tube near uterus	Died with marked cerebral symptoms
6	Albert	1901	21	—	Removal of tumour size of man's head; adherent to neighbouring organs	Recovery; well one year later	—	
7	Senarclens	1902	38	Abdominal pains; serosanguineous vaginal discharge; malaise	Removal of tumour size of adult's head from Douglas's pouch by morcellement	Death	Metastases in lungs, heart and thyroid, left kidney and left suprarenal	
8	Vassmer	1903	31	—	Removal of tumour of the right tube; size that of a closed fist	Died shortly after	No autopsy	

9	Hinz	1904	33	Abdominal pains, uterine bleeding and fainting attack five weeks after last period	Right tubal swelling removed (along with small wedge of uterus); five weeks later a recurrent nodule removed from uterine cornu	Death seven weeks after second operation	Metastases in liver and lungs; local recurrence	Typical chorion-epithelioma; cystic ovaries
10	Risel	1905	33	Brownish, then red vaginal discharge; attacks of abdominal pain (diagnosed as ovarian cyst or pyosalpinx)	Tumour of the left Fallopian tube removed by morcellement	Death four months later	Local recurrence; metastasis in liver	Typical chorion-epithelioma; right ovary cystic
11	Vieting	1910	42	Symptoms of ectopic gestation	Two months after first symptoms a tumour of the left tube, the size of child's head, was removed	Was dying when case reported; had hæmoptysis	—	Typical chorion-epithelioma
12	Jeanneret	1912	23	Six weeks after a period acute abdominal pain and fainting; brownish vaginal discharge; increase in size of abdomen; four months later discharge of blood *per rectum*; great loss of weight; too ill to operate	No operation	Death	Large hypogastric and pelvic tumour involving the right Fallopian tube; adherent intestine and omentum	Chorionepithelioma composed chiefly of syncytium; cystic ovaries
13	Miles Phillips	1908 (not published till 1911)	28	Profuse bleeding; hypogastric pains on and off for five months; last child one year previously	Left tube removed; tumour recurred, so hysterectomy was performed	Recovery; alive three years later	—	At second operation a tumour seen at the root of the mesentery, but could not be removed; had cough and blood-stained sputum at one time
14	Cope and Kettle	1912	41	Symptoms of ruptured extra-uterine gestation; then abdominal tumour causing increasing intestinal obstruction	Large hypogastric and pelvic tumour removed by morcellement; three weeks later attempt to remove; recurrence	Death	Local recurrence; metastases in lungs, liver and intestine	
*15	Lofqvist	1909	37	Symptoms of tubal pregnancy	Removal of affected Fallopian tube	Recovery	—	Salpingitis years previously; tubal abortion two years previously

---

* At the time of reading the paper this case was not known to the author.

metastases in the liver and lungs (fig. 2). All the sections present much the same appearance, though some are much more satisfactory than others; perhaps the best preparations were obtained from the invaded uterine wall and the peritoneal deposits. In all the sections the growth is extremely hæmorrhagic; this is its most marked characteristic, and some of the metastases consist almost entirely of fibrin and fluid blood with only a very few tumour cells at the periphery. In other sections, notably in the uterine fragment, there is a broad band of growth at the periphery, although the older portions are entirely hæmorrhagic, and here the structure of the tumour can be studied satisfactorily. In the uterus (fig. 1) the growth is extremely cellular, consisting of long columns of cells which are invading the muscle tissue from the peritoneal surface by way of the capillaries, spreading out in alveolar form. There is no supporting stroma, and no true blood-vessels are found in the tumour; the malignant cells grow into, and are nourished by, the uterine capillaries.

Two main types of cells can be distinguished corresponding to the Langhans's cells, and the syncytium of the chorionic villi; for the most part the syncytial type of cell is found at the growing margin of the tumour, either closely applied to the underlying Langhans's cells, or extending freely into the adjacent healthy tissue, but often there is a close intermingling of the two types. The Langhans's cells are polygonal or spheroidal in form, though they show some variation as the result of pressure, and are closely packed together; they contain a single, relatively large nucleus with well-marked chromatin network and nucleolus, and often exhibit karyokinesis. The syncytium appears as large, multi-nucleated plasmodial masses, or long-drawn-out processes often resembling endothelium. The cytoplasm is often vacuolated, and the vacuoles are occasionally occupied by red blood cells. The nuclei are usually irregular, and stain deeply and diffusely—though in some of the plasmodial masses or giant cells they are much clearer, and show a definite chromatin network. Although the masses are sometimes small, syncytium can be made out in almost every section.

Pathologically, then, the tumour is undoubtedly a chorionepithelioma malignum. Its extreme vascularity and rapidity of growth, its mode of dissemination by direct implantation, or by the blood-stream, and its histological characters, all combine to form a typical picture of this form of malignant growth.

BIBLIOGRAPHY.

ALBERT. *Zentralbl. f. Gyn.*, Leipz., 1901, xxv, p. 1430.
GEBHARD, C. *Zeitschr. f. Geb. u. Gyn.*, Stuttgart, 1897, xxxvii, p. 504.
HINZ, G. *Zeitschr. f. Geb. u. Gyn.*, 1904, lii, p. 97.
JEANNERET, LUCIEN. *Rev. méd. de la Suisse romande*, 1912, xxxii, p. 337.
LÖFQVIST. *Zentralbl. f. Gyn.*, Leipz., 1909, xxxiii, p. 153. (Transl. by Alban Doran, *Journ. of Obstet. and Gyn.*, 1909, xvi, p. 406.)
MARCHAND, F. *Monatschr. f. Geb. u. Gyn.*, Berl., 1895, i, p. 419.
NIKIFOROFF, T. N. *Russich. Archiv f. Path.*, 1896, i, p. 257.
PHILLIPS, MILES. *Journ. of Obstet. and Gyn. of Brit. Emp.*, Lond., 1911, xix, p. 502.
RISEL, W. *Arb. a. d. Path. Inst. z. Leipz.*, 1903, p. 85.
SENARCLENS, V. DE. *Thèse de Lausanne*, 1902.
SNEGIREW, W. *Mayotschuja Krowotelschenija Moskau*, 2 Aufn., 1895, p. 197.
THORN. *Münch. med. Wochenschr.*, 1897, xliv, p. 1400.
VASSMER, W. "Path.-Anat. Arb.—Joh. Orth. z.—Prof. Jubilaum," Berl., 1903, pp. 237-77.
VIETING, ERNST. Inaugural Dissertation, Univ. Wurzburg, 1910.

DISCUSSION.

Mr. MILES PHILLIPS stated that his patient, who had been referred to by Mr. Cope, was still living and in good health. The last operation, in which the uterus with the recurrent growth in the broad ligament and the metastatic growths in the bladder and vaginal walls were removed, had been performed four and a half years ago. The large irremovable growth, presumably of chorionepithelioma, in the mesentery had gradually disappeared within ten months of the operation. Hæmoptysis had occurred during the illness and was presumably caused by a deposit in the lungs. The disappearance of metastatic growths after removal of the primary focus had been observed in several cases of *uterine* chorionepithelioma, and Professor Teacher had demonstrated the pathological changes by which this remarkable disappearance is brought about. Extreme malignancy was one of the chief features in the few recorded cases of chorionepithelioma of the Fallopian tube, but his own case had been the exception. Knowledge of this case would appear to justify a surgeon in carrying out a wide excision of the primary focus and any accessible metastatic nodules, in the presence of irremovable secondary growths. He also stated that, as in Dr. Wilson's case of chorionepithelioma of the uterus, intraperitoneal hæmorrhage had occurred from a small rupture in the primary tubal growth, and that this had led to the diagnosis of tubal gestation. Finally, in considering the ætiology, he referred to Löfqvist's case in which this malignant growth had occurred in a tube from which an ovum had aborted and been removed by abdominal section with conservation of the tube.

The PRESIDENT congratulated the authors on their careful account of this very rare condition. He asked if it had been possible to demonstrate the pre-existence of a hydatid tubal mole in any of the fourteen cases collected by them. Did they know of any case of hydatid tubal mole apart from chorionepithelioma? It was undoubtedly the case that several cases of uterine chorionepithelioma had recovered after the primary growth had been removed, even when metastases were known to have been present in inoperable areas. A few such cases had recovered without any operation having been done. This merely proved that the malignancy of chorionepithelioma varied greatly. Unfortunately pathologists were not yet able to certify which hydatid moles and which syncytial new growths were really malignant.

Mr. Cope, in reply, stated that as far as he could ascertain, in no case had a hydatid tubal mole preceded tubal chorionepithelioma.

Obstetrical and Gynæcological Section.

May 1, 1913.

Dr. Amand Routh, President of the Section, in the Chair.

Solid Tumour of Ovary and Broad Ligament Cyst.

By C. E. Purslow, M.D.

The patient, aged 35, and the mother of one child, was admitted to the Queen's Hospital, Birmingham, on the recommendation of Dr. Donnell, of Hinckley, Leicestershire. She stated that for six months her abdomen had been steadily getting larger; she had slight pain at times, but no other symptoms. Menstruation, micturition and defæcation had been normal. On examination she presented a thin-walled, apparently unilocular cystic swelling, filling the abdomen and reaching to the ensiform cartilage; this was diagnosed as, probably, a parovarian cyst.

The abdomen was opened, the cyst tapped, and 17 pints of fluid withdrawn; there was a well-marked broad pedicle which was tied in sections, and the cyst, together with the corresponding ovary, was removed. The other ovary was then examined and was found to be enlarged to the size of a tennis ball. This was removed. On section this tumour presents a firm, solid surface and a distinct enclosing capsule; to the naked eye the tumour appears to be a fibroma, but the microscopical section shown gives the appearance of sarcoma.

Report of the Pathology Committee.—"We have examined fresh sections of this tumour prepared by Dr. Barris and are unanimously of opinion that the growth is a fibroma with no evidence of sarcoma."

A Special Vaginal Clamp for use in Radical Hysterectomies (Wertheim).

By R. Drummond Maxwell, M.D.

The special instrument shown to-night in apposition on the vagina of a uterus removed some weeks previously was suggested to me as a result of many observations made on the action of Wertheim's vaginal clamps: I do not think I have ever satisfied myself that a complete occlusion of the vagina has been attained by their use, and that the vaginal capsule (of the new growth) forms a watertight compartment. The reason of this is obvious: no pair of rigid-hinged forceps can effect equal pressure on the enclosed tissue from heel to tip; the greater the crushing effect at the heel the more certain the absence of approximation at the tip. At first sight this difficulty would appear to be overcome by a clamp and applied on each side: as a matter of fact, this makes little practical difference, and even though the tips overlap the middle line considerably the capsule remains far from watertight. To obviate this difficulty it is essential to give a certain amount of "whip" to one or both blades of the occluding instrument. Berkeley and Bonney have recognized this difficulty, and, so far as I know, their instrument, an admirable combination of vaginal clamp and hysterolabe, is the only one

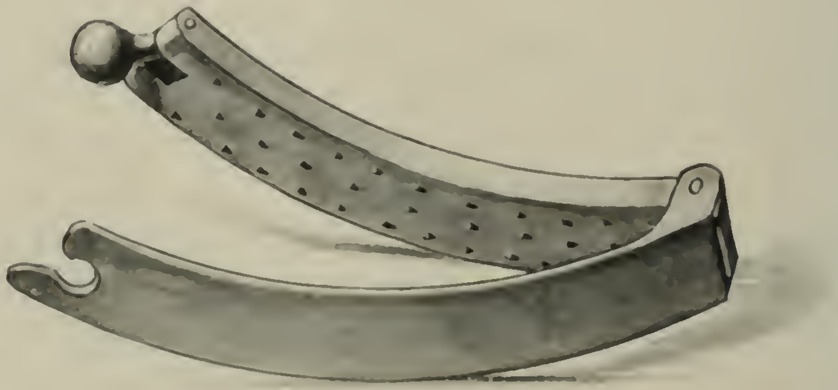


Fig. 1.[1]

Vaginal clamp. In front is the thin pliable blade with a slot to receive the swivel on the rigid serrated blade.

---

[1] The figures are taken from Herman and Maxwell's "Diseases of Women," 1913.

in use which guarantees a watertight vaginal capsule by the perfect approximation of its two bars.

The instrument I show to-night is extremely simple and owes its form to the suggestions of Mr. H. S. Souttar (of the West London Hospital), with whom I discussed this difficulty. The instrument, very slightly convex along its lower edge, consists of two arms moving in a horizontal plane during apposition. The anterior arm, slightly longer than the posterior, is thin and "whippy," with the result that not till tissue is included will it approximate in length to the posterior solid

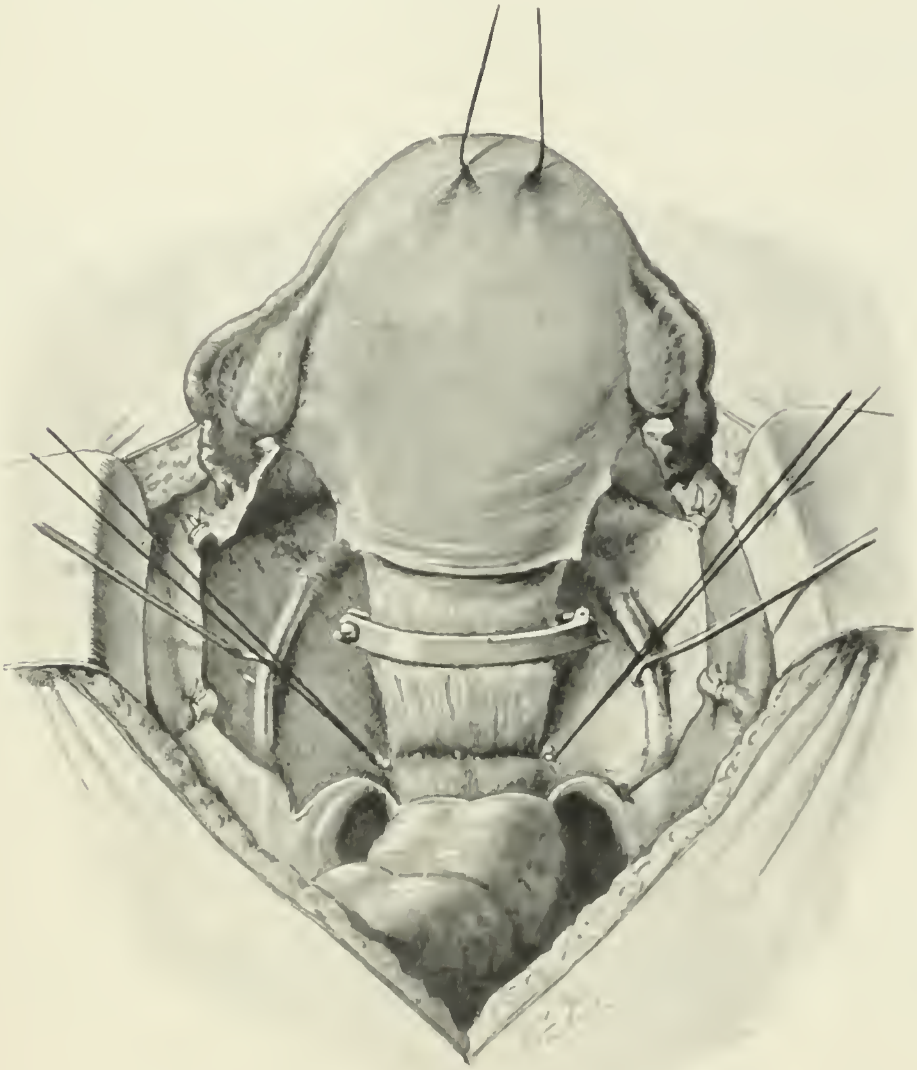


Fig. 2.

View of pelvic cavity from behind. The clamp applied to the vagina: the lateral blood supply of the vagina has been secured by a couple of ligatures immediately before dividing it below the clamp.

arm and permit of engagement of the catch. Provided the paravaginal tissue is well freed at the terminal stages of the operation, there is no difficulty in applying it round the vagina, and little risk to the ureters and posterior wall of bladder during this stage. The slight convexity has been given to the lower edge to facilitate section of the vagina below this level. The breadth over all is approximately 3¼ in. (8 c.m.), and I have not found this measurement in any way embarrassing as regards the application of the clamp.

DISCUSSION.

Dr. ANDREWS said the clamp struck him as being a very good one. He suggested that the addition of two or three teeth on each side would give a stronger grip, and make the clamp less likely to slip off the vaginal wall.

Dr. EDEN said that he agreed that it was difficult to find a satisfactory instrument for clamping the vagina in Wertheim's hysterectomy. Being dissatisfied with the double clamps used by Wertheim himself on account of the difficulty of approximating them accurately, he had had made a heavy single clamp, the blades of which were curved so that heel and toe would grip equally the vaginal tissues. But when cutting below the clamp he found that the vaginal walls tend to slip out of its grip, thus exposing the cervix. He had tried another single clamp, used by Dr. Berkeley and Dr. Bonney, and found that it failed in the same way. It appeared to him that if Dr. Maxwell's clamp were made heavier, so that when closed it would compress the vaginal walls more firmly, it would be a great improvement on any other form.

Bacterial Infection of the Fœtal Membranes from a Case of Hydrorrhœa Gravidarum.

By E. NAPIER BURNETT, M.D.

THE specimen which I bring before your notice to-night consists of the placenta and fœtal membranes from a case of hydrorrhœa uteri gravidi. The pathological lesions manifested in the specimen are deemed to be of sufficient importance as to justify their demonstration before this Section.

Clinical history: The patient is aged 28 and has been married five years. Her general health has always been good. Menstruation, which commenced at the age of 14, has always been regular, but profuse, lasting four to five days and accompanied by pain during the first two days. Two years after marriage the uterus was dilated and curetted because of the menorrhagia and sterility; this was followed by temporary improvement, especially of the dysmenorrhœa. A similar operation was performed some two years later and the patient conceived about four months afterwards. During the first four months of pregnancy I saw the patient on several occasions and always found her in excellent health—the urinary analysis showing nothing abnormal. One day during the twentieth week of gestation the patient complained of a watery discharge coming from the vagina; this was followed two days later by a more copious flow; otherwise there was no complaint and the fœtal movements continued to be felt by the patient. This discharge of clear fluid continued intermittently for sixteen days, when the patient complained of labour pains which terminated in abortion; the fœtus was delivered as a "breech" and manifested life on delivery. There was practically no liquor amnii at birth, and the placenta and membranes were discharged spontaneously. On examination of the membranes one noticed an area about the size of the palm of the hand which appeared thickened and yellowish; over the extent of this area the two membranes seemed adherent to each other, and could not be rubbed the one on the other as elsewhere. This piece of membrane was the first to be discharged and was situated most distally to the placenta. The patient had an uninterrupted convalescence, except for an unusually severe mammary congestion. The lochia had completely disappeared on the fourth day of puerperium. On the eighth day after delivery the patient was seized with sharp abdominal pain and vomiting, the temperature rising for the first time since parturition to 99·8° F. There was distinct tenderness over McBurney's area and a diagnosis of appendicitis was arrived at, but all the symptoms subsided within twenty-four hours.

Subsequent history: Menstruation returned about a month after delivery—the first period being very profuse and lasting six days; the second period occurred four weeks later and was much less severe. Being desirous of ascertaining whether any infection remained in the endometrium and also of removing her appendix before she should again become pregnant, I curetted the uterus and had the scraping examined bacteriologically, but with a negative result, both in smear preparations and in culture media; histologically, there was no evidence of any foci of inflammation, the tissue appearing normal and presenting the characteristic features of endometrium in the post-menstrual phase—namely, œdema or loosening of the stroma with plump-looking cells and numerous mitotic figures in the gland epithelium. The appendix with its mesentery was markedly injected and contained about 2 dr. of purulent fluid.

PATHOLOGICAL REPORT BY STUART McDONALD, M.D.

The placenta shows no evidence of fatty degeneration or necrosis; the chorionic villi appear normal in all respects.

Histology of Membranes.

(1) *Section of Membranes near the Placenta.*—The amniotic surface is covered with a single layer of short cuboidal epithelial cells; the membranes otherwise consist of fibrillar connective tissue, among which are a few spindle-shaped connective tissue cells. Here and there scattered polymorphonuclear leucocytes are to be seen, the nuclei of many of these being fragmented and degenerated; there are no definite

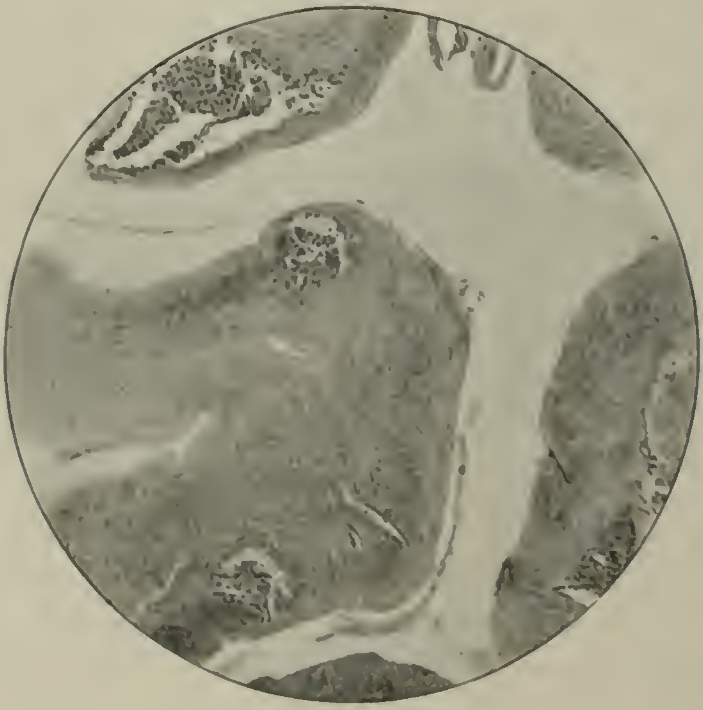


FIG. 1.

Showing a section of the thickened fœtal membranes from the cervical region. The chorion shows marked inflammatory thickening with some necrosis. The inflammatory foci, consisting largely of polymorphs, are situated towards the surface of the chorion, producing nodular bulgings in that direction. (Low power. Hæmatoxylin and eosin.)

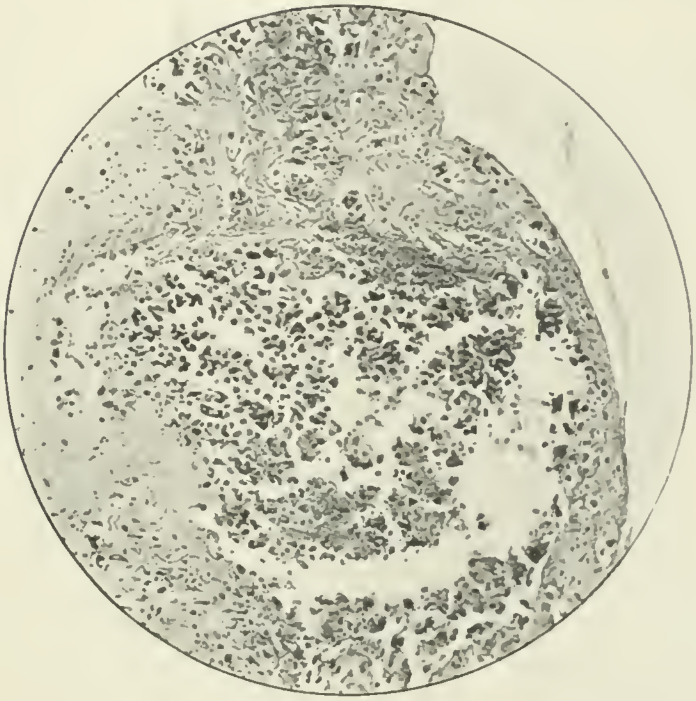


FIG. 2.

From the same region as specimen No. 1. Showing one of the inflammatory foci in the necrosed layer of the chorion. Note the miliary abscess-like formation surrounded by necrosed fibrinous tissue. (High power. Hæmatoxylin and eosin.)

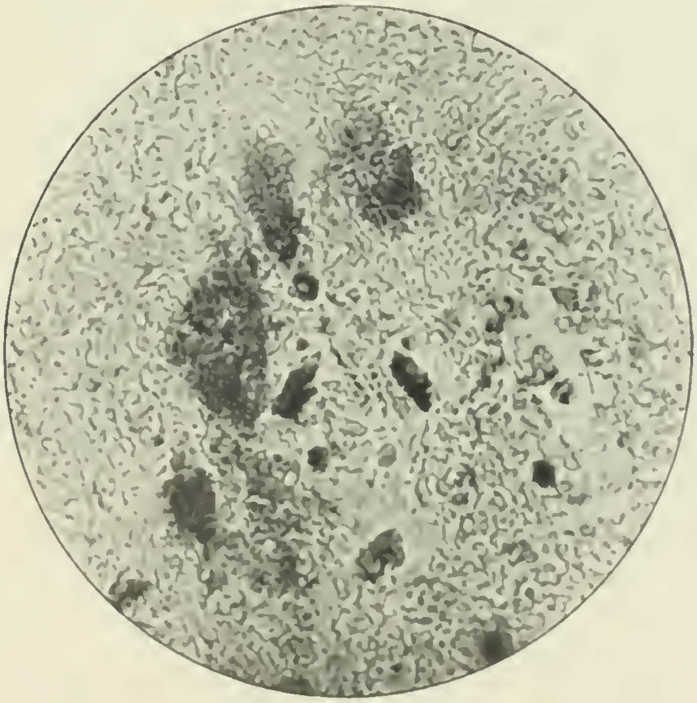


FIG. 3.

Showing masses of minute diplobacilli in the inflammatory exudate; the bacilli are most numerous towards the surface of the chorion. (Oil immersion of high power. Carbol thionin.)

inflammatory foci in this part of the membranes, neither was there evidence of any necrosis. The chorion in this region appears to be devoid of cellular elements.

(2) *Section through the Thickened Membranes at the Opposite Pole from the Placenta.*—The first striking difference observed in this region is the great thickening of the membranes: this thickening, however, is not regular. In this region the thickness varies from twice to five or six times that observed near the placenta. The increase in thickness is obviously more particularly on the part of the chorion, which presents irregular nodular bulgings on its decidual aspect. The appearances of the amnion itself do not differ materially from those observed in the placental neighbourhood; it is, on the whole, slightly thinner, and is more homogeneous and condensed, but a fibrillar structure can still be made out. The amniotic cells on its inner surface are for the most part shed, but can be still seen here and there. Immediately subjacent to the amnion is a broad cellular layer consisting practically entirely of polymorphonuclear leucocytes entangled in fibrinous threads; some of these leucocytes are perfectly preserved, while others show a degenerative fragmentation of their nuclei. Among the leucocytes numerous red blood corpuscles can be seen. External to this zone of leucocytic infiltration, there is a distinctly necrotic layer, averaging about one-third of the total thickness of the membranes. On the free surface are numerous perfectly preserved leucocytes, red blood corpuscles, and some fibrin. The outer necrotic zone consists largely of granular condensed fibrin, in which the cells for the most part are staining badly, and in places are completely necrosed; through it are also diffused fine chromatin dust from broken-down nuclear tissue. At intervals in this necrotic zone are definite inflammatory foci resembling miliary abscesses, the larger of which are bulging outwards on the decidual aspect. Those inflammatory foci were so suggestive of a bacterial infection that sections were stained for bacteria with carbol thionin blue and by Gram's method.

An examination of these sections demonstrates an extensive bacterial invasion of the whole thickness of the membranes. Numerous bacteria are found on both surfaces of the membranes, and clumps of them are to be seen in the substance of the necrotic zone, especially in relation to the inflammatory foci described in this layer. The organisms are minute bacilli; some are extremely short, presenting a cocco-bacillary form, corresponding approximately in size to the influenza bacillus. The organisms are Gram-negative, and some show distinct bipolar staining. As there was no suspicion of bacterial infection at the time of parturition, the tissues were placed in a preservative solution at once, and thus, owing to the absence of cultural observations, it is impossible to determine the exact nature of the organism in question.

COMMENTS ON THE CASE.

Of the several points of interest suggested by this case I would mention the following three as being worthy of discussion, viz:—

(1) *The Source of the Fluid discharged.*—Of the two prevalent views as to the nature of hydrorrhœa gravidarum, the present case lends support rather to the more recent one, as advocated by Stoeckel[1]—namely, that the escape of fluid is due to a premature rupture of the fœtal membranes, rather than to the collection and escape of a decidual secretion. The large amount of fluid discharged in the present case, coinciding as it did with diminution in size of the abdominal tumour, and also the absence of liquor amnii at birth, support the view of ruptured membranes.

(2) *The Source of the Organisms.*—My patient was not examined vaginally until labour was in progress; the probability is strong that the organisms had been introduced from without at some previous date, and had since been lying about the genital canal. One cannot help thinking in this connexion that but for extreme care in strict antiseptic precautions and the use of sterilized gloves that the introduction of some other organism might have lit up a virulent infection.

(3) *The Cause of the Membranes Rupturing.*—I take it—but on this point I would specially like to have the opinion of the Section—that the two most common causes of rupture of fœtal membranes during pregnancy are traumatism and infection. The problem in this case may be expressed thus: Was the bacterial infection the *primary cause* that so weakened the membranes that the intra-amniotic pressure led to their rupture?—or, Was the infection an ascending one from the lower genital passage, and causing a *secondary* invasion of the ruptured membranes?

I am unaware of any case of this kind, presenting such definite pathological lesions, having been previously reported. In September, 1912, at the Sixth International Congress of Midwifery and Gynæcology in Berlin, Gottschalk demonstrated a case of hydrorrhœa uteri gravidi in a woman, aged 35. The case was under observation for forty-six days, and the escaping fluid was chemically examined and found to contain urea and albumin; and in the centrifugate were isolated lanugo hairs between superficial epithelial cells, clearly demonstrating that the fluid was liquor amnii. Gottschalk says that, as a result of his histological examination—and his findings show a resemblance to those of the case I have described—for the first time it has been possible to explain pathologically the rupture of the membranes. He says: "The membranes show a condition of complete necrobiosis and diffuse infiltration with leucocytes. This necrobiosis is to be attributed to a disturbance of nutrition induced by an accumulation of leucocytes between the amnion and the chorion." Apparently Gottschalk has made no special staining for the presence of bacteria, so I have sent him one of my slides, and suggested that he might compare it with one of his own case, especially with the object of ascertaining the relationship of bacterial invasion to the rupture of the membranes. Clearly in similar cases the membranes and the liquor amnii ought to be carefully examined for organisms.

---

[1] *Centralbl. f. Gyn.*, 1899, xxiii, pp. 1353-1361.

DISCUSSION.

Dr. EDEN said that he thought Dr. Napier Burnett's case was probably one of spontaneous rupture of the membranes in pregnancy, and not a true case of hydrorrhœa gravidarum at all. Only sixteen days elapsed between the first discharge of fluid and the occurrence of labour, and there was no doubt that the fluid was really liquor amnii. It was not at all uncommon for an interval as long as this to intervene before labour ensued, when the membranes ruptured spontaneously at the end of pregnancy. Dr. Burnett's demonstration of the bacterial invasion of the patch of chorion, and the minute changes in the tissues at the seat of invasion, was very interesting. It was highly probable that the bacteria concerned were vaginal organisms which had made their way up into the uterus, and for some reason had found conditions present which enabled them to colonize in the chorionic tissues. Systematic histological examination of the membranes was seldom carried out, and it was possible that such an occurrence as this was not so rare as might at first sight be supposed.

Dr. DRUMMOND ROBINSON thought that the reader of the paper had done a good service in directing attention to a condition which was little known, but which might easily prove to be more common than was thought. He agreed with Dr. Eden's criticism of the title of the communication. He referred to two cases in which watery discharge had occurred from the vagina for several weeks during pregnancy. In the first case the fluid — considerable in quantity—had no apparent similarity to liquor amnii. The pregnancy terminated normally at the full term. In the second case the discharge, which possessed the odour peculiar to liquor amnii, continued for three weeks when the pregnancy terminated in premature labour. He could not help feeling that these two cases were essentially of a different character, and the second one, similar to that reported by Dr. Burnett, ought not to be described as a case of hydrorrhœa gravidarum. With reference to bacterial infection of the chorion, it was a well-known fact that both the vagina and cervix normally teemed with organisms. It had been shown that after rupture of the membranes the liquor amnii sometimes became infected by these organisms, and it seemed possible that infection of that part of the chorion which covered the internal os by cervical bacteria might be of fairly common occurrence. He hoped that the report of this case might attract the attention of other observers to the subject.

The PRESIDENT (Dr. Amand Routh) thanked the author for bringing this case before the Section. It was the only case with which he was acquainted where inflammatory changes associated with bacillary infection of the chorion had been demonstrated in hydrorrhœa gravidarum. The origin of the fluid discharge in these cases was often obscure, but he felt sure that some of the cases were of inflammatory origin, for he had seen hydrorrhœa follow in cases where in the early weeks a brown, grumous discharge had been present, indicating, he thought, decidual endometritis. Other cases, especially in the later months, were probably secretional and of glandular origin. Others, again, seemed to be due to rupture of an adventitious cyst of the chorion, or of the chorion alone, allowing the escape of fluid between the chorion and amnion. The diplobacillary infection was an important observation, and would lead, he hoped, to wider bacteriological examination of the membranes in similar cases.

Dr. ANDREWS gave a short account of a case in which pregnancy continued for nearly four months after rupture of the amnion. He saw the patient first on August 21. The last period had been on March 4 ; quickening occurred on July 21. In the middle of June there had been a large gush of clear fluid during a motor ride, which soaked her clothes and the seat of the car. On August 6 there had been a good-sized gush of clear fluid. Since then the patient had been in bed with occasional slight loss of clear fluid, only once blood-tinged. The uterus reached up to an inch below the umbilicus; the fœtal heart was not heard with any certainty, but a movement of the child was felt. The body of the uterus was unusually hard and firm, and ballottement could not be obtained. He saw the patient again on September 17 when the uterus was about $\frac{1}{2}$ in. above the umbilicus. There had been a little watery discharge on two or three occasions. Labour came on spontaneously on October 9; the child, who weighed little over 3 lb., was born alive, and eventually did well. The doctor and the nurse were both certain that no liquor amnii came away during the labour.

Dr. BURNETT, in reply, thanked the President and the Section for the kind way in which they had received his communication. He could not say what means were used by Gottschalk for the recognition of urea in his case, as such were not stated in the German publication, but the finding of the lanugo hairs between the epithelial cells was in itself sufficient proof of Gottschalk's contention that he was dealing with liquor amnii. In reply to several members who expressed their experience of cases of "hydrorrhœa" that had gone to "full term," Dr. Burnett quoted Gottschalk's statement—viz., "Of all cases hitherto observed, not a single one has reached the normal end of pregnancy"—obviously referring to the cases with escape of liquor amnii. The modern tendency in obstetric literature was to describe cases of hydrorrhœa uteri gravidi under the title of "*glandular hyperplasia of the decidua*," but this title was surely inapplicable to that class of case illustrated by Gottschalk and the present author, where the lesion was manifestly in the fœtal membranes, and not in the decidual glandular tissue. A fresh classification of these cases of hydrorrhœa required to be made—viz. (1) cases of excessive glandular activity of the decidua which may have escape of fluid continuing throughout the whole term of pregnancy, and in no way interfering with the normal process of gestation; (2) cases where the lesion is in the fœtal membranes, with escape of liquor amnii, and which invariably fail to reach the normal termination of pregnancy. Dr. Burnett said that he had hoped the discussion of his present communication would have taken more cognizance of the bearing that such cases as the one he had shown might have on the development of "puerperal infection."

An Unusual Case of Rupture of the Uterus.

By RUSSELL ANDREWS, M.D.

MRS. C., aged 32, was admitted into the London Hospital on February 13, about twenty-four hours after the termination of her third labour. Her first two labours, neither of which had been prolonged, were both terminated by forceps. In her third labour the doctor had pulled the head through the brim of the pelvis with forceps with great difficulty. The labour lasted about twelve hours. The doctor said that the "forceps locked easily, but in applying them the uterus appeared to be anteverted, and he had difficulty in getting the head through the brim, nearly pulling his arms off. The child was born alive with the occiput in front—directly afterwards a pendulous mass came down through the vulva." The placenta was removed by hand. No dressing had been applied and no treatment had been adopted. The doctor considered that the uterus was ruptured and that the patient would die. The patient looked extremely ill, grey-faced and anæmic; the pulse was weak, about 130 per minute. The swollen, torn cervix protruded 3 or 4 in. from the vagina. It was very dark in colour, almost black, and smelt offensively. She was anæsthetized, put in the lithotomy position, and the parts very thoroughly cleaned up. Examination showed the following lesions: (1) There was an incomplete rupture of the perineum, with much bruising of the vaginal walls. (2) The vagina was completely separated from the cervix except for about 3 in. in front and to the right side. (3) The lower uterine segment and cervix were separated from the upper uterine segment except on the right side and in front. (4) The lower uterine segment and cervix were torn through from top to bottom on the left side. The bladder was not injured. Cleaning up caused free hæmorrhage from the torn edge of the vagina and from the lower edge of the upper uterine segment. There was a large quantity of blood in the peritoneal cavity. It seemed to me that the damage was too severe to admit of the possibility of repair, and that if an attempt at repair were made the patient would undoubtedly suffer severely from sepsis, as there must be a considerable amount of sloughing, and I decided that vaginal hysterectomy would be the quickest and safest method of treatment. The portion of the vagina which still remained attached to the cervix was cut through. Separation of the bladder from the cervix was not easy from below, so a hand was introduced into the peritoneal cavity behind the uterus and the body was retroverted and brought out by pulling from below and pressure from above. After the right broad ligament and what remained of the left broad ligament had been ligatured and cut through, the bladder was separated from above as in abdominal hysterectomy. The torn left uterine artery could not be found—it had probably curled up in the base of the broad ligament. I should have preferred to have washed out the lower part of the peritoneal cavity, but thought it unwise to do this as it might start hæmorrhage from the left uterine artery. The anterior and posterior peritoneum and the vaginal walls were sewn together and a large drainage-tube was inserted, leading from the peritoneal cavity into the vagina. The perineum was then repaired and the patient returned to bed. She had stood the operation only fairly well, the pulse-rate, when she got back to bed, being 136 per minute. She was much troubled by vomiting for the first twenty-four hours, during which time there was incontinence of urine, but by the second day the bladder retained urine normally. For the first six days there was incontinence of fæces: after this the patient's general condition improved steadily, although the pulse remained at about 120 and the temperature between 100° and 103° F. for a fortnight. For four and a half weeks there was pyrexia, with a pulse-rate of over 100. There was some peroneal paralysis on the right side, which improved slowly. The patient was walking about four and a half weeks after the operation.

On examination of the uterus, which is shown, it is not easy to make out exactly what has happened, but the drawing and diagram will, I hope, show how the uterus should be "reconstructed."

The explanation of this unusual injury to the uterus must be that one blade of the forceps, if not both, was applied outside the uterus, the cervix and part of the lower uterine segment being pulled away with the head by main force. When it is remembered that this damage was done without an anæsthetic, and that no treatment of any kind was adopted for nearly twenty-four hours, it is remarkable that the patient did not succumb to shock and hæmorrhage.

Cases of rupture of the uterus during delivery are still, unfortunately, common, but this case seemed to me to be sufficiently unusual to warrant my bringing it before the Section.

Dr. ANDREWS, in replying on the discussion which followed, said that he thought the Members might be interested to hear the story of a specimen that was in the London Hospital Museum. Soon after the birth of the placenta the midwife noticed that there was a large mass filling up the vagina. She said that she did not know what it was, but whatever it was it ought not to be there, so she seized it and removed it by pulling and twisting. The patient fainted, and the midwife sent for a doctor, who found that the mass removed was a completely inverted uterus. The vagina was occupied by intestine. As there was practically no hæmorrhage he did not adopt any local treatment except packing in some gauze. The patient made an uninterrupted recovery, and was delivered of another child in little over a year. The explanation of this apparently extraordinary event is found on examination of the inverted uterus that had been removed, which shows that it was the left half of a double uterus: the right side of it is smooth and has no structures projecting from it, while on the left side are seen Fallopian tube, ovarian vessels and part of the uterine artery. The specimen is No. 2113 in the Catalogue.

Cyst of Ovary filled with Rounded Balls.[1]

By Thomas Wilson, M.D.

Ovarian cysts filled with spherical balls floating in fluid are not very commonly met with. In the London *Obstetrical Transactions* for 1912, xliv, p. 354, Victor Bonney related a case of this kind, and referred to seven other recorded instances. In the case here related a cyst was removed with peculiar contents, the more solid parts of which consisted of one-third fat and two-thirds albuminoids, allied to those found in the supporting tissues; the fluid when freed from suspended fat contained 3 per cent. of solids, of which the chief were a mucin-like body and salts, especially chlorides and sulphates. The cyst had a thin lining of condensed and degenerated fibrous tissue with no epithelial covering. It was embedded in adhesions and had probably originated between the layers of the right broad ligament; this could not be certainly proved and the tumour may really have been retroligamentary. The corresponding Fallopian tube was in close relation with the surface of the cyst. The uterus and right appendages were embedded in a hard and dense mass of cicatricial tissue, in the midst of which was a small collection of fœtid caseous material.

The cyst almost certainly originated in the right ovary; the extensive pelvic inflammation was of very old standing and uncertain nature, probably gonorrhœal or tubercular, and the ovarian tumour was probably of equal or greater age. The chronic inflammatory condition surrounding the mass and affecting the blood supply no doubt played a principal part in producing the peculiar character of the contents.

H. P., single, aged 63, was admitted to the General Hospital on December 11, 1912, complaining of pain in the rectum. This was first noticed five months before and had gradually become worse; it was worse on sitting and was so severe on defæcation as to make her cry out; the pain was dull and aching constantly, with sharp shooting exacerbations. Until three months ago the bowels were very constipated, but since then there had been more or less diarrhœa, the motions being thin and light-coloured. The patient had become much emaciated in the last few months. Five years ago the left breast was removed for cancer and four months later an operation was performed for recurrence. The patient has otherwise been healthy all her life and has had to work hard.

---

[1] Read at the meeting on April 3, 1913.

On examination the scar of the breast operation was healthy and no disease of the vital organs could be made out. In the right side of the pelvis was a rounded tumour rising into the lower abdomen, a little to the right of the middle line; the tumour was fixed and slightly tender. The uterus appeared to be distinct but adherent to the left lower part.

On December 14 the abdomen was opened by a suprapubic transverse fascial incision and a rounded elastic swelling was seen on the right side of the pelvis, apparently growing between the layers of the broad ligament. Coils of small and large intestine were adherent and the cavity of the true pelvis was completely roofed in by adhesions between intestine and bladder, and by an inflammatory mass on the left, which later proved to be in relation to the left appendages. No trace of the uterus could be made out at this stage. The peritoneum covering the neoplasm was incised, the right round ligament divided and the tumour enucleated entire from its bed, apparently between the layers of the right broad ligament. The position of the tumour in the pelvis was such that its long axis was almost vertical; the pedicle consisted only of a little cellular tissue and blood-vessels; the right Fallopian tube was attached to the lower end of the growth.

An attempt was then made to enucleate the left appendages. These formed a mass of almost stony hardness densely adherent to the intestines and side of the pelvis. In separating the adhesions an inflammatory cavity was opened containing about 2 dr. of white caseating material of offensive fish-like odour. The atrophic uterus was buried below the bladder in a mass of adhesions. A dissection was made through the base of the right broad ligament and the vagina opened. The incision was carried round the cervix and the atrophic uterus removed from below upwards with as much of the inflamed left appendages as possible. Bleeding points were then secured by catgut ligatures and sutures. A strip of bismuth gauze was carried down into the vagina and the pelvic cavity was shut off by suturing the vesical peritoneum to appendices epiploicæ of the sigmoid. The abdominal incision was then closed by layers of interrupted catgut sutures to peritoneum, muscles and fascia, and silkworm sutures to the skin. The patient bore the operation well and made a smooth recovery. She was seen on April 2, well and free from complaints.

Parts removed: These weighed 1 lb. 4 oz., and the oval elastic tumour from the right side measured 6½ by 4½ by 3 in.; it appeared to have developed between the layers of the broad ligament, and at the lower pole the smooth peritoneum was still covering the cyst. The remainder of the surface was rough and extraperitoneal. The Fallopian tube could be traced over the surface of the cyst; the last 1 in. was free and projected from the lower pole of the growth. There was no mesosalpinx. On section the cyst was unilocular with thin fibrous, translucent walls. There was no evidence of rugæ or of any partitions. No hæmorrhage had occurred into the cyst. The wall was lined internally by pearly-white coagulated material. Microscopically the wall was formed of connective tissue, and there was a distinct thin tunic of condensed layers of connective tissue with numerous small spindle cells concentric with the cavity.

The contents of the cyst were remarkable and call for special description. The other parts removed consisted of the cervix and a part of the right wall of the uterus only. The posterior uterine wall was absent, as also were the left appendages. The tissue thought to be the latter consisted of peritoneum and inflammatory products only. The cervix was atrophic but otherwise normal.

The cystic contents comprised a brownish-yellow, semi-opaque fluid and a mass of rounded and opaque balls varying in size from a millet seed to a good-sized marble. These balls were of two kinds, the majority yellow ochre in colour but on section showing a white translucent core; scattered amongst these were balls of flakes of the same white translucent material that lined the cyst and formed the central core of the yellow balls. Both white and yellow materials were soft and putty-like in consistence. The contents of the cyst were sent to Dr. Cranston Walker for detailed examination, and he reported as follows:—

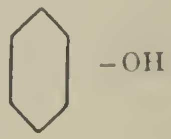
The material includes a solid and a liquid portion. Two different constituents are obviously present in the solid part, and the liquid part consists of suspended matter and the liquid proper. There are, therefore, four constituents to be described in the specimen.

The solid part: This consists of irregularly rounded lumps, varying in size from a cherry downwards. Most lumps consist of an irregular white core, upon which is moulded a drab-brown material; some of the smallest lumps consist of the brown material alone. The white material is somewhat like coagulated egg-white; it is friable and rather irregular in texture. The brown material is pultaceous and fairly uniform throughout. It is almost impossible to separate the two materials.

Microscope: The material is too friable to enable frozen sections to be cut. Paraffin sections of the white substance show a material arranged in thin fibres and sheets, forming an irregular three-dimensioned network. The fibres and sheets branch and anastomose freely; they do not give the staining reactions of collagen, elastin, or fibrin. Cells are altogether absent. Paraffin sections of the brown material show fine amorphous particles, irregularly arranged. Cells are again entirely absent.

Chemical: Quantitative experiments have been made on the mixed white and brown lumps, owing to the difficulty of separating the two substances. The lumps freed from adherent moisture by pressure between filter-papers contain 79 per cent. water and 21 per cent. solids. The solid part contains 35 per cent. fatty bodies soluble in ether. These are mostly contained in the brown substance.

The white material contains the elements CHON, and a small proportion of sulphur; phosphorus is not present in any considerable quantity. The material is not soluble in dilute acids or alkalies; it is unaffected by peptic and by pancreatic digestion. In boiling water it swells up into a somewhat flocculent mass; no gelatin passes into solution. This mass is equally inert to chemical and digestive agencies. With strong H_2SO_4 it chars, suggesting a possible carbohydrate group. With strong HNO_3 the xanthroproteic reaction is given, showing the presence of a benzene ring. Millon's reaction is not given, showing the absence of a phenyl group:—



and therefore of a tyrosin group. Other protein reactions cannot be tried as the substance cannot be got into solution. The rather scanty evidence points to the substance being an "albuminoid" similar to the substances occurring in supporting tissues. Keratin and elastin resemble it in their inertness and the resistance to peptic and tryptic digestion, but differ by containing a tyrosin group. Collagen differs by yielding gelatin and by being digested in gastric juice. Reticulin is a collagen-like substance occurring in the supporting structure of lymph-glands, spleen, &c. It is very inert and resists gastric and pancreatic digestion ; it contains a benzene ring, but not a phenyl group. It therefore agrees to a great extent with the substance under examination : it, however, contains 0·3 per cent. of phosphorus, whereas the white material under examination does not contain any considerable quantity of this element.

The brown material gives none of the protein reactions. It is unaffected by gastric and by pancreatic digestion. It consists chiefly of fatty bodies soluble in ether, with a small coloured remainder, not dissolved by ether, xylol, &c., and of undetermined nature. In the fatty bodies little or no neutral (glycerine ester) fats are present. The fatty material consists chiefly of fatty acids, hence the absence of change in pancreatic juice. There are also present "lipoids" containing nitrogen, and containing phosphorus (lecithin possibly being included), and cholesterin. Unsaturated chains are present. Doubly refracting substances are absent.

The fluid portion of the material is easily separated by filtering or centrifuging into suspended matter and clear liquid.

The clear liquid is light amber coloured, neutral in reaction, has a specific gravity of 1015, and contains 3 per cent. solids. The principal solids present are : A mucin-like body ; salts, including chlorides and sulphates ; phosphates are not present in any quantity. Protein is only present in slight traces ; nucleo-protein is absent. Urea is absent. Sugars are absent.

The suspended matter is pale drab in colour. Microscopically it is seen to consist chiefly of particles which give the staining reactions of fatty acids and lipoids ; these particles appear to be the same as those composing the brown material of the lumps. A few cells are present of two kinds : (1) Large ovoid or irregular cells with relatively small nuclei ; both nuclei and cytoplasm stain with eosin and not with basic dyes ; the cytoplasm is often very finely vacuolated ; no definite structure can be seen in the nuclei. These cells much resemble detached epithelial cells from the mucous membrane of the mouth or the bladder. (2) Small round cells with polymorph, basophile nuclei ; these cells resemble degenerated leucocytes.

[*Addendum.*—After the report of the Pathology Committee was received a further examination was made of the cyst and its contents.

This leaves no doubt that the specimen is a dermoid, and the contents degenerated epithelium and fat. A more detailed description of the appearances will be published elsewhere at a later date.]

Report of the Pathology Committee.—"We have examined a section of the wall of the cystic tumour and are of opinion that it possesses a distinct epithelial lining. This has the characteristics of stratified epithelium much flattened and degenerate. Having this structure, we are of opinion that the tumour is a dermoid cyst and the character of its contents as described in the report support this view."

Obstetrical and Gynæcological Section.

June 5, 1913.

Dr. Amand Routh, President of the Section, in the Chair.

Puerperal Venous Thrombosis after a Normal Labour, associated with Pyrexia, continuing for Five Months.

By Arnold Lea, M.D.

It is generally recognized that during the course of the normal puerperium blood coagula often form in the placental sinuses, apart from any obvious infection, and may extend into the uterine and pelvic veins. The severe forms of this disease ending in pyæmia are extremely rare at the present time. The case of venous thrombosis which I am reading before this meeting appears to be one of these attenuated types of infective phlebitis, which often pursue a prolonged course, and may even follow a normal labour. I have been able to obtain, by the courtesy of the patient's doctor, the temperature charts of this patient, which begin at the time of labour, January 8, 1913, and terminate on June 2, 1913.

On March 18, 1913, I was asked to see, in consultation with two medical men, a patient suffering from this condition. The confinement took place on January 8, 1913. This was a natural delivery of a full-term, living child. She progressed favourably until the twelfth day (January 20). In the evening the temperature rose to 103·6° F. with a rigor. The medical man in attendance washed out the uterus for some days without any definite effect on the temperature. The pulse averaged 96 to 100 per minute. The patient took food well. The bowels acted normally. This rise of temperature of the remittent type continued for several weeks, varying from 101° to 103° F. Tuberculosis was suspected and a well-known physician was called in. He was able to negative the existence of this disease. The symptoms continued throughout February and March until I saw her on March 18. Some swelling of both legs had been noticed ten days before my visit, but no albumin was present in the urine. Five rigors had occurred during the course of the illness, the last being on March 15. The patient was in good condition when I saw her. The temperature in the mouth was 101·6° F.; the pulse 98. There were no signs of endocarditis. Abdominal symptoms were completely absent. Bimanual examination of the pelvis revealed thrombosis in the pelvic veins on both sides. The uterus was somewhat fixed, though in the normal position. This induced me carefully to examine the veins in the lower limb. Thrombosis of the left femoral vein was obvious; and the whole leg was œdematous. There was also some degree of swelling of the right thigh and leg.

The diagnosis was clearly puerperal toxæmia of an unusually prolonged type. I advised absolute rest in bed, careful dieting, and no local treatment of any kind, and that this should continue until the temperature had become normal and the pulse was below 100.

Although this case has pursued an unusually prolonged course, there has been no sign of embolism or detachment of clot.

I have received a later report as to the progress of this case. The thrombosis of the left femoral vein cleared up. The right femoral vein for a time was thrombosed. The latest report of the patient's condition I received from her medical attendant on June 2. After progressing favourably for a time, in the third week of May an abscess developed near the left hip-joint. This, as the temperature had again become high, was evacuated under anæsthesia. Pus escaped freely. The temperature has now fallen almost to normal. The doctor informs me that there is still slight swelling of the left leg, but the right leg is quite normal.

From reviewing the literature on this subject I find that Rielander, of Marburg, states that in a series of 6,000 cases puerperal thrombosis developed in twenty-three only—i.e., 0·4 per cent. Von Herff, of Basle, states that in his clinique no less than 2 per cent. of puerperal women showed signs of thrombosis. Embolism only occurred in 0·3 per cent. of these patients.

DISCUSSION.

The PRESIDENT (Dr. Amand Routh) thought at first this was one of those cases where rigors and pyrexia occur during the puerperium without any evidence of sepsis. This case, however, seemed to be one of pyæmia, ending with suppuration in the hip. Cases of thrombosis of the pelvic veins without sepsis came under a different category. Sir John Williams used to teach that thrombosis of a pelvic vein, such as the ovarian, would cause a rigor even if no actual sepsis was present. Dr. Routh alluded to such a case beginning on the twelfth day, with rigors about once a week and normal temperature between the rigors. No physical signs developed, the uterus involuting normally, and the patient eventually recovered after six or seven serious rigors, the temperature in one case reaching 106·8° F. In that case no diagnosis was made.

Dr. TATE had met with a somewhat similar case about three years ago in a patient whose uterus had to be explored five days after labour for some retained placental tissue. After this operation the patient had a very irregular temperature, with occasional rigors. Four weeks after delivery a fairly circumscribed, irregular swelling, as large as a walnut, was felt in the right broad ligament. This gradually cleared up, but the symptoms persisted and the patient began to have attacks of severe pain in left ovarian region, with temperature of 104° and 105° F. Another small swelling developed in the base of the left broad ligament, quite hard and well defined. As the patient's attacks of pain became more acute it was thought probable that there was some focus of suppuration, even though the physical signs did not at all suggest an intraperitoneal or cellulitic abscess. Six weeks after the confinement, the abdomen was explored and a small focus of suppuration was found at the back of the broad ligament just below the inner part of the left Fallopian tube, and a second small collection in the cellular tissue of the left iliac fossa. Both abscesses were treated with gauze drainage. The patient's convalescence was delayed owing to an attack of phlebitis of the legs, but eventually she made a complete recovery.

Dr. EDEN asked Dr. Lea why he used the word toxæmia in the title of his case? The condition appeared to be pyæmic, but the name toxæmic was generally reserved for non-septic intoxication. He agreed that septic phlebitis affecting the deep pelvic veins was a comparatively rare condition; it was also very difficult to recognize by clinical methods. He had also removed the ovarian vessels for septic phlebitis, but the condition was not recognized until after the abdomen had been opened. The case was that of a young primipara, aged 21, who had been suffering for five weeks from severe septic infection before her admission to the Chelsea Hospital for Women. Pelvic examination suggested a double pyosalpinx, but on opening the abdomen the swelling was found to be mainly cellulitis, the tubes being patent and undilated. In separating a tag of omentum from the left broad ligament a small abscess was opened and about ½ dr. of pus escaped. On further examination it was found that the left ovarian vein was greatly thickened from the ovary far upwards in the direction of the kidney. It was decided to remove it and the artery and vein were accordingly dissected out from the renal vein down to the uterus, the tube and ovary being taken with them. The operation presented no difficulty, the ureter being easily seen and avoided. The patient made a rapid and complete recovery. Mr. Glendining, who examined the specimen, reported that there was no thrombosis in the veins, although their walls were thickened, and he failed to obtain cultures from them either. The condition was, therefore, probably less serious than it appeared, and the success of the operation must be attributed to evacuation of the broad ligament and abscess.

Two Cases of Solid Pedunculated Papilloma of Ovary.

By Corrie Keep.

Case I.

M. P., single, aged 37, recommended to me by Dr. Devitt, was admitted under my care at St. Saviour's Hospital on January 11, 1912. The history given had no clinical interest whatever in regard to the ovarian growth. The patient had an attack of fairly acute appendicitis in June, 1911, followed by more or less constant discomfort in the right side of her abdomen and obstinate constipation. Her menstruation had always been normal, and never accompanied by dysmenorrhœa. No pelvic pain, loss of flesh, nor serious illness had ever been complained of.

On examination, resistance and tenderness on pressure over the cæcal area were noticed, but no abdominal swelling could be detected. *Per rectum*—vaginal examination being undesirable owing to the hymen being unruptured—a swelling of doughy consistence was felt high up in the pouch of Douglas, and free of a normal uterus. Other than this no ovary could be palpated on the right side, but the left uterine appendages appeared to be of normal size.

A diagnosis of chronic appendicitis and an ovarian growth of doubtful nature was made.

On January 15, 1912, the abdomen was opened in the middle line, a chronically inflamed, very adherent appendix vermiformis taken away, and an œdematous, multilobulated, yellowish, lipomatous-looking tumour, growing on a thin pedicle from the outer pole of the right ovary, was pulled up from behind the uterus and removed *en masse* with the ovary and Fallopian tube. The tumour was not adherent, its only attachment being to the right ovary. The uterus and left Fallopian tube and ovary were healthy except for a broad ligament cyst the size of a large pea which was enucleated from the ovarian fimbria of the left tube.

The patient made an uneventful recovery.

Pathological Report.—The tumour since its removal has considerably diminished in size, owing doubtless to the serum producing the œdema, present at the time of operation, being extracted by the spirit in which it has been preserved. The specimen consists of a right Fallopian tube, mesosalpinx, and ovary. The ovary measures 1 in. in its long diameter, and its surface shows irregular depressions. Its outer extremity is prolonged into a rounded pedicle, from which spring numerous outgrowths varying greatly in size and shape, forming, as a whole, a highly lobulated growth hanging 3 in. below the ovary. The pedicle passes down to the lowest lobule, which is pyriform, measures 1 in. in its long diameter, and carries two smaller lobules on its upper surface—the whole resembling a fatty growth. Numerous similar but smaller growths spring from the pedicle higher up, and upon the surface

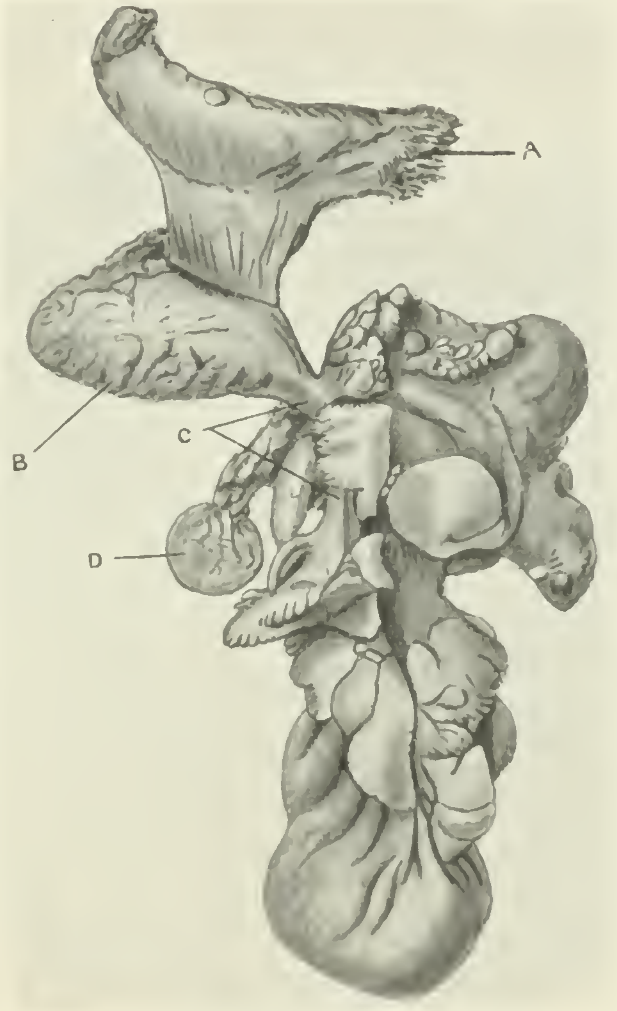


Fig. 1.

Solid papilloma of ovary. Case I. **A**, fimbriated extremity of Fallopian tube; **B**, ovary (right); **C**, pedicle running from ovary on to the tumour; **D**, thin-walled cystic lobule.

of the ovary are minute growths apparently of a similar type. A thin-walled cyst, ¼ in. in diameter, is attached to the primary pedicle, near the ovary, by a secondary pedicle, bearing minute papillomatous outgrowths. On the anterior surface of the mesosalpinx are an accessory fimbria with a long pedicle, and a smaller pedunculated body apparently connected with the parovarian (Kobelt's tube). On the posterior aspect of the Fallopian tube is an accessory hydrosalpinx, the size of a millet seed.

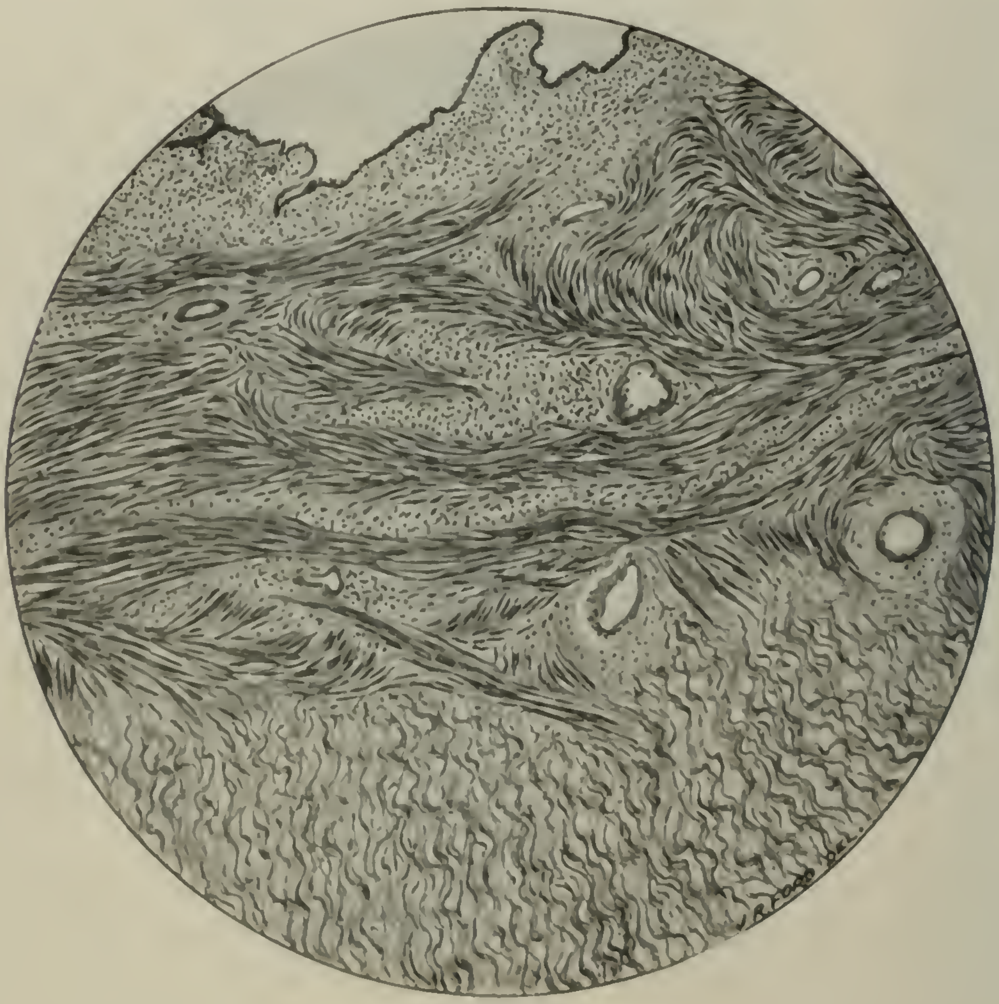


Fig. 2.

Microscopical section of growth in Case I.

Microscopic Appearance.—Professor Shattock, having had sections prepared from several of the lobules, reports that there is no fatty tissue in any part of the growth. The stroma is composed of loose fibrous tissue invested with non-ciliated epithelium like the germinal epithelium of the ovary. In one section only a small area of plain muscular fibre is detected.

CASE II.

E. T., single, aged 27, recommended to me by Dr. Selby, was admitted under my care at the Samaritan Free Hospital on January 27, 1913. In this case also the history had no relation to the ovarian condition found. About 1909 patient had what she was told was acute peritonitis in the right side of her abdomen, since when she had had frequent attacks of discomfort in the appendicular region, obstinate constipation, and occasionally symptoms simulating gastric ulcer, but without hæmatemesis. Her menstruation had always been rather erratic, occurring at intervals of from four to six weeks, each period lasting five days with scanty loss, and accompanied during the first few hours by acute dysmenorrhœa in the lower part of the abdomen and in the sacral region. Beyond the dysmenorrhœa the patient had had no pelvic pain. When examined, nothing wrong beyond slight tenderness on pressure over the cæcal area, a large left ovary, and a long, conical cervix was detected.

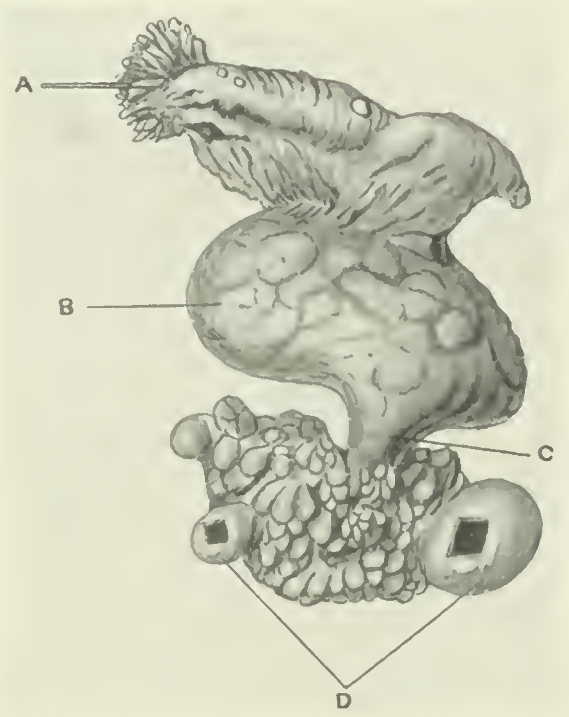


FIG. 3.

Solid papilloma of ovary, Case II. **A**, fimbriated extremity of Fallopian tube; **B**, ovary (left); **C**, pedicle running from ovary on to tumour; **D**, thin-walled cystic lobule.

Chronic appendicitis and an unhealthy left ovary were diagnosed.

On January 29, 1913, I opened the abdomen in the middle line, removed a long, adherent, inflamed appendix vermiformis, and took away the left ovary and Fallopian tube, the ovary bearing the papillomatous growth to be described. There were no adhesions about the tumour, and the uterus and right Fallopian tube and ovary appeared healthy.

The patient recovered satisfactorily.

Pathological Report.—The tumour has shrunk considerably in the spirit it has been preserved in, and undue pressure in a bottle has altered its original appearance. The specimen consists of a left Fallopian tube, mesosalpinx and ovary. The ovary measures 1⅝ in. in its long diameter, and its surface is slightly corrugated; a thick short pedicle, measuring ⅜ in. both in length and width, extends from its lower convex border ⅞ in. from its outer extremity, and immediately splits up into the components of a highly lobulated mass of firm consistence, measuring 1⅜ in. by 1 in., and much resembling a cauliflower in appearance and the arrangement of its lobules. Several small pedunculated, thin-walled cysts spring from among the lobules, the largest growing from the inner border and measuring ½ in. in diameter. Upon the back of the Fallopian tube are three tiny cystic swellings.

Microscopic Appearance.—The stroma consists of bundles of degenerative loose, wavy, fibrous tissue, invested externally by a single layer of epithelium resembling the germinal epithelium of the ovary. Here and there throughout the stroma, but chiefly near the surface, are small spaces lined with a single layer of epithelium, which may be looked upon as inversions of the outer covering of the tumour producing a cyst-like appearance. No plain muscle-tissue can be detected.

REMARKS.

In regard to the nomenclature of these growths I have used the word "papilloma" in its true meaning, and not in relation to the fibro-œdematous condition associated with ovarian and other cysts that usually bears this name.

In comparing the two tumours it is noted that they have practically all points in common. Both have the same macroscopic arrangement, and, in the main, the same microscopic structure, while neither gave rise to any clinical symptoms. They differ, however, in the following details: the first specimen has a plump and lipomatous-looking appearance, without doubt due to œdema, and shows microscopically the presence of one small area of plain muscle-fibre, but no cyst-like spaces in the stroma. On the other hand the lobules of the second specimen are small, dense, and rough, and under the microscope degeneration of the fibrous stroma and the presence of cyst-like spaces are apparent, but no plain muscle-tissue can be detected. The œdema is of no pathological importance, and neither are the cyst-like spaces, if I am correct in believing them to be merely inversions of the epithelial envelope.

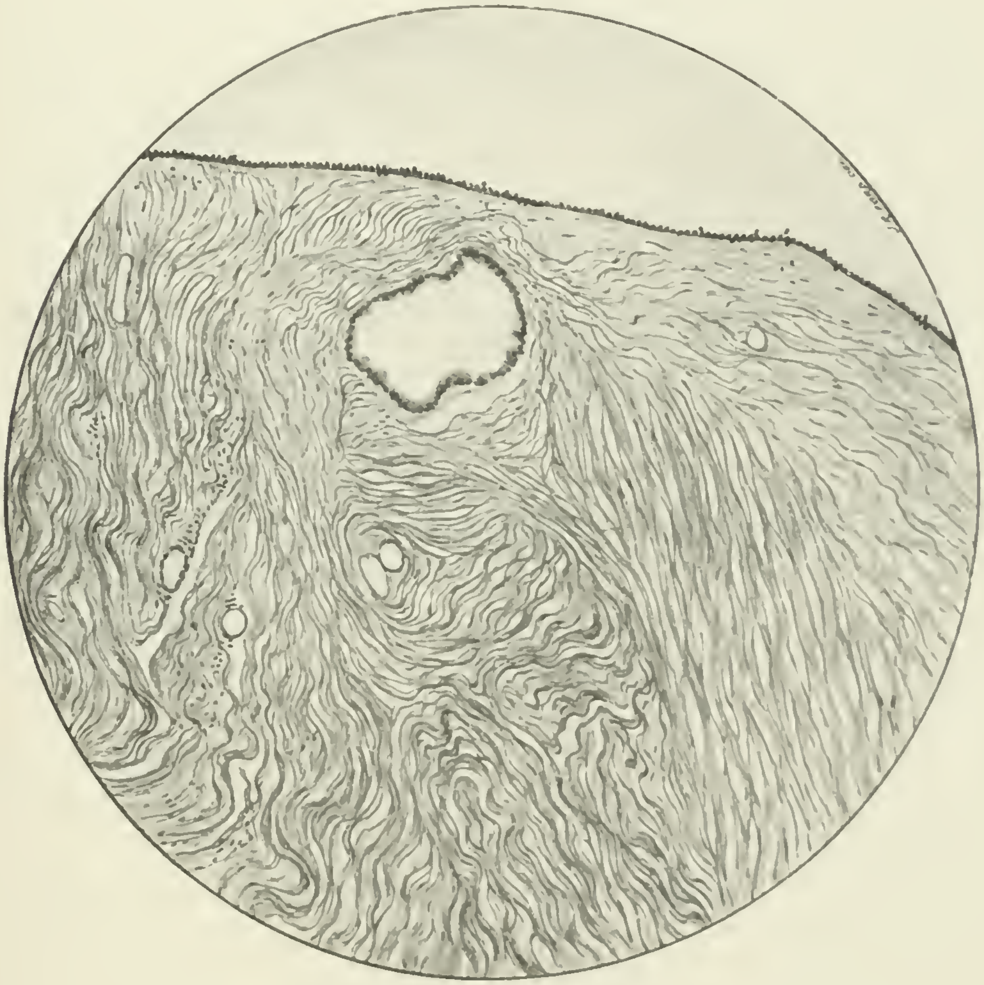


FIG. 4.

Microscopical section of growth in Case II.

Therefore the presence and absence of plain muscle-tissue is the sole distinguishing feature between the two specimens.

The chief points of interest in these cases seem to be: (1) The bundles of long, wavy, fibrous tissue composing the stroma, which in no way resemble the short fibres of ovarian stroma and ovarian fibromata; (2) the attachment of each tumour by a distinct pedicle to an otherwise apparently healthy and active ovary.

I can find no reference to any ovarian tumour possessing these characteristics, but Sänger and Barth[1] have recorded a nearly similar pedunculated growth arising from the fimbriæ of an otherwise healthy left Fallopian tube which they considered to be of congenital origin. To the naked eye they describe it as being multilobulated and looking like a bunch of fruit. Microscopically, they found it to be invested externally with ciliated epithelium, beneath which was connective tissue and some muscle-fibres, while the stroma was composed of loose connective tissue. Marked degeneration, due to arteritis, was observed, in parts, producing cavities filled with yellow, turbid fluid, blood, and broken-down tissue, but not lined with either epithelium or endothelium.

As to the origin of these tumours, I cannot imagine that they were derived from ovarian tissues, and I am sure they are not grafts from other organs or parts. I am therefore inclined to look upon them as arising from an embryological area, such as the Müllerian duct or the pronephros. This view is supported by the presence of other embryological abnormalities in both cases—namely, the accessory fimbria and the Kobelt's tube—both recognized as arising from the pronephros[2] in the first specimen; and the accessory hydrosalpinges seen in both specimens, which, according to Kossman[3] and Handley,[4] originate from the Müllerian duct. In addition, the thin-walled pedunculated cysts present amongst the lobules in both cases closely resemble a hydroparasalpinx derived from a tube. This suggests that the tumours may also be Müllerian in origin.

I have to thank Mr. Alban Doran for the great help he has afforded me in describing the first specimen, and Professor Shattock for his report upon its microscopical structure.

Report of the Pathology Committee.—The Committee reported as follows: "We have examined the specimens and sections and agree with the description given by the author; we are of opinion that the growth has originated in the ovary, and is not of Müllerian origin."

---

[1] Martin, "Krankheiten der Eileiter," Leipz., 1895, p. 294.

[2] Professor Arthur Keith, "A Demonstration of Specimens illustrating Cysts of the Female Appendages," *Journ. of Obstet. and Gyn. of Brit. Emp.*, 1910, xviii, pp. 246-51.

[3] Martin, "Anatomie und Pathologie des Nebeneierstocke," "Die Krankheiten der Eierstocke und Nebeneierstocke," Bd. iii, Berl., 1906.

[4] "On the Origin from Accessory Fallopian Tubes of Cysts of the Broad Ligament situated above the Fallopian Tube," *Journ. of Obstet. and Gyn. of Brit. Emp.*, 1903, iv, p. 456.

The Intra-abdominal Pressure in Pregnancy.

By R. H. PARAMORE, F.R.C.S.

SYNOPSIS.

(I) THE observations of the pressure in the rectum in pregnancy; and a comparison with the pressure found in the non-pregnant for similar positions.

(II) A criticism of the observations and arguments of those who say the intra-abdominal pressure is not increased in pregnancy.

(III) Reasons for believing the intra-abdominal pressure is increased in pregnancy: The reactions of the body wall muscles and thoracic diaphragm in pregnancy; and the cause of the same.

(IV) Conclusion: The fallacies to be guarded against in the interpretation of the pressure values found in the stomach in pregnancy; and the variations in pressure to be expected at different times of pregnancy.

I.

My observations of the pressure found in the rectum in various postures in pregnant women—the list of which is before you and on which this paper is based—show that that pressure as a rule is increased considerably in pregnancy. All these observations, except that of Case 5 (in which the subject was a private patient and married), were made on inmates of an institution,[1] where single women who had become pregnant were not only confined, but actually lived for many months of their pregnancy. I have records of twenty-four cases. Of these, nineteen were primi-gravidæ; five were second cases. Records from two non-pregnant women are given as guides to the normal—making twenty-six cases. Many of the patients were examined at different times of their pregnancy; and eleven of the primi-gravidæ and three of the secundi-gravidæ after labour as well—making fifty-eight observations in all. It will be noticed two of the primi-gravidæ were suffering from the toxæmia of pregnancy, and that the figures obtained from them are strangely high. I include them here, because they came in the series. The first formed the basis on which my opinion, that this disease is to be explained mechanically, arose—an opinion I stated before this Section in February, 1909. In spite of the summary dismissal of this opinion at that time, it was destined to receive, a month later, remarkable support from the even higher figures obtained in the second case. And prolonged thought during the last four years has established it for me; and I believe, when I come to deal with it, I shall be able to substantiate it in every particular. I make that statement now, because I wish to engage your interest in the subject before us—the intra-abdominal pressure in pregnancy. It is this which when exaggerated causes, in my opinion, the toxæmia of pregnancy. But it is too big a subject to be dealt with fully in one evening. Many of the initial difficulties have been considered in my lecture on the same pressure in man—i.e., in the non-pregnant—to which I beg to refer you [18]. Others must be left over for future consideration. To-night I shall limit myself to the statement that the pressure within the abdomen and above the uterus is increased in pregnancy.

---

[1] "The Homes of Hope," 4, 5, and 6, Regent Square, London, W.C.

My method of investigation of the pressure within the abdomen during pregnancy was divided into two parts. The first referred to the volume of the abdomen, the size of the pelvis, and the state of the muscles; the second to the pressure found in the rectum. As regards the first, I measured the diameters of the pelvis; the girth of the abdomen, at the level of the thoracic base and at the umbilicus, both at rest and at the height of a deep breath; the separation of the recti; and the distance along the superficies of the abdomen from the summit of the symphysis pubis to the ensiform cartilage and on to the suprasternal notch, the latter measurement being taken both at rest and at the height of a deep breath. All these were taken with the patient lying flat on her back; but when the separation of the recti was being measured the patient was asked to raise her head slightly to render prominent the margins of the recti so that they could be defined. When this had been done, the patient having turned on her side, I introduced a small bag (an ordinary thin rubber finger-stall), partially distended with air, and connected by a tube with a mercurial manometer (such as I show) into the rectum, and recorded the pressure in different postures. My method was to keep my eye on the manometer, and to call out the figures, which were entered in a book by someone else.[1] In the records submitted, the pressure values are given in the sequence in which they were usually obtained. After the bag was got into the rectum the first figure was read out. The patient was then asked to cough: the mercury then should rise to a considerable height and return immediately. If it did not rise well, it showed something was wrong and the bag was adjusted. The patient was next asked to turn on her back and to lie quite flat. The resulting pressure was always higher than when on the side, as it is in the non-pregnant (a significant relation), and in some cases almost as high as when the woman was standing erect (as in Cases 7, 8, 9, 10 and 14; in 15 it was even higher).

Next the patient got into the knee-chest position. To obtain a negative pressure, the thighs had to be vertical, the sternum on the couch, the back well arched. Even then, in some cases, no negative pressure was found, for instance, in the toxæmic cases. Then she turned on her side again, and the pressure again read. It was often found, after this manœuvring, that the reading now obtained was lower than when the bag was first introduced for the same position. The agitation, fear of the unexpected, had passed away; the patient had got accustomed to the performance, and the muscles, we may take it, were not more contracted than usual for this position. Moreover, the diminution of the pressure in the rectum (due to the knee-chest position), and the variations caused by movement from one posture to another, had allowed the bag to adjust itself to its surroundings, so probably the reading gave a true value of the pressure.

Now see the remarkable difference exhibited by a comparison of the pressure values found in the left lateral position—the patient lying with the thighs and legs flexed, at ease—in cases of pregnancy with those found in non-pregnant women with flat abdomen in similar position. Whereas in the latter the pressure was only 6 to 8 mm. Hg., in the former it was often twice as much, and in some cases more than three times (as in Cases 1, 7, 9, 12, 13, 14, 15 and 16): and especially was this pressure value marked in the two cases of toxæmia of pregnancy (Cases 18 and 19: 18 mm. Hg. in the first, and 22 to 37 mm. in the second).

The patient was next asked to get off the couch and to stand straight up. The pressure values found were usually higher than in the non-pregnant, but not so much as to be in proportion to the values found in the lateral position and when on the back: 30 mm. Hg. was quite common. In the toxæmia cases they were extremely high; in the second, the highest of all. The patient, still standing, was now asked to bend forwards: the pressure generally fell as it does in the non-pregnant, but nothing to the like extent. Next she was asked to catch hold of the leg of the table and to raise it — generally with a considerable elevation of the pressure. Next she got back to the couch and the pressure in the left lateral position again read; and finally was asked to strain, and then the tube was removed. On straining, the pressure did not always rise as much as one expected.

---

[1] The figures called out did not represent the pressures to which they referred. This was worked out, subsequent to the examination, by subtracting from the figure at which the mercury stood for any one posture, the figure representing the zero point. The remainder was then doubled, since, as the mercury rises in one arm of the manometer, it sinks as much in the other.

In many cases, in the columns, double figures are given. You will not be surprised at those variations, which represent the highest and the lowest of a reading. Where single figures are given, the pressure was quite steady, as it often is, and represents the pressure value. It must be remembered that even small movements cause changes in the pressure, and that slight alterations in posture also do so.

II.

Now the question is, What is the interpretation of the increased pressure found in the rectum in pregnancy? Is it due to the increased weight of the uterus and its contents? Or is it due to an increased tonic contraction of the abdominal wall and thoracic diaphragm? In the past it seems the former belief prevailed. It has been thought that the abdominal wall and thoracic diaphragm play no part in the increase of rectal pressure; that the pressure above the uterus, for instance, on the liver and kidneys, is not increased. It is said the abdominal wall yields to the distension of the uterus, like it does when food is taken into the stomach; and by a relaxation prevents a rise of pressure. Thus, Schatz [20], in 1872, measured the pressure in the rectum by connecting it with a water manometer in two cases of normal pregnancy —the first a moderately strong secundi-gravida, aged 22, in the ninth month of pregnancy; the second a normally formed primi-gravida, aged 25, at the end of the sixth month of pregnancy—and, in spite of the much higher values obtained in these cases, as compared with those he had found in the non-pregnant, said: "The intra-abdominal pressure often does not rise at all through the marked distension of the abdomen by the uterus, or it even sinks at the end of pregnancy" [19]. The following are the figures Schatz gives. Side by side with these I place the figures given by him as the pressure values in the rectum for corresponding positions in the non-pregnant—all in *centimetres of water*.

Position	Case 1	Case 2	Non-pregnant
Flat on back	36	30	14
Standing erect	36	34	28
Sitting upright	40	36	32
Lateral position	18	20	10
Semi-prone	8	—	8
Knee-hand	2	—	4
Knee-chest	−6	—	−8

Schatz explained the marked increase in pregnancy as due to the increased weight of the uterus—which the readings in the supine, but especially in the lateral position, can hardly be said to support. He said the intercostal muscles hypertrophy in pregnancy, and by raising the ribs cause an expansion of the thoracic base, as Matthews Duncan [4] thought. But he went further and said that in the latter months of pregnancy the enlarged uterus acts as a prop, and by thrusting the abdominal wall forwards prevents it from compressing the epigastric viscera as much as it otherwise would do. Thus he came to the opinion that the pressure in this region is not raised at all, or perhaps even sinks at the end of pregnancy.

Moritz [12] (1895), who made exhaustive examinations of the pressure in the stomach, both on himself and on others, examined the pressure in the stomach in five cases of pregnancy. He gives the following figures as the minimal and maximal pressures found in these cases in the sitting posture:—

(*a*) Ninth month (? para[1]), aged 21	8 to 12 cm. H_2O.
(*b*) Eighth month, II-para, aged 21	15 ,, 18 ,,
(*c*) Seventh month, I-para, aged 28	7 ,, 11 ,,
(*d*) Ninth month, I-para, aged 26	12 ,, 22 ,,
(*e*) Ninth month, I-para, aged 22	5 ,, 9 ,,

[1] "para" here should presumably read "gravida."

He says: "Only in two of these cases, (*b*) and (*d*) did the maximal pressure exceed the maximal limit of 16 cm. of the normal condition. In the other cases the maximal pressure was within the normal limit: whilst the minimal fell within it in all cases."

Comparing these figures with those Moritz gives for the non-pregnant, we find that the average of numerous measurements on himself of the pressure in the stomach in the sitting posture was only 8 cm. H_2O. Only in the last of the cases of pregnancy was the average lower than this. So it is plain from his figures that the stomach pressure in pregnancy not only may be greater, but usually is greater, than in the non-pregnant, even though the increase be small. And they at once put Schatz's supposition that the pressure in the stomach either remains the same or even falls in pregnancy out of court. The fact that the pressure in the stomach is always positive shows how erroneous was Matthews Duncan's hypothesis. But Moritz has given other figures for the pressure in the stomach in pregnancy [13]. Side by side with these I put the figures given by Moritz as the average of six determinations taken on himself in corresponding positions, which will serve as an index to the non-pregnant, and which he himself gives as the normal.

(*C*) Secundi-gravida, aged 21, eighth month of pregnancy:—

		Non-pregnant
Back	16 to 18 cm. H_2O	6·3 cm. H_2O
Left side	18 ,, 19 ,,	14·7 ,,
Right side	18 ,, 19 ,,	3·8 ,,

(*D*) Primi-gravida, aged 26, ninth month:—

Right side	7 to 9 cm. H_2O	3·8 cm. H_2O
Sitting	12 ,, 13 ,,	8·0 ,,
Left side	16 ,, 18 ,,	14·7 ,,

(*E*) Primi-gravida, aged 22, ninth month:—

Back	11 to 12 cm H_2O.	6·3 cm. H_2O
Left side	15 ,, 16 ,,	14·7 ,,
Right side	7 ,, 9 ,,	3·8 ,,

Now comparison of the pressures found in the cases of pregnancy with those in the non-pregnant show at once that the values in pregnancy are considerably greater. But Moritz has given figures in a girl, presumably non-pregnant, which compare very favourably with those of Cases D and E; and in one of the six determinations on himself, from which the averages given were taken, he gives very similar figures.

Case B.—A girl, aged 20 (presumably non-pregnant):—

Right side	6 to 8 cm. H_2O
Left side	14 ,, 20 ,,
Back	12 ,,

Case A.—Moritz himself (Experiment 6):—

Back	12 to 13 cm. H_2O
Right side	5 ,,
Left side	19 ,,

This being so, we will discount Cases D and E. The increase such as they show may have been due to pregnancy or to some other adventitious cause. But let us fasten our attention on Case C. It is plain at once there is something wrong here; for in this case the pressure in the stomach in the left lateral position is not only greater than that Moritz gives as the average for that position in the non-pregnant, but the pressure in the right lateral position, which usually is much lower than that in the left (because of the liver weight) is here equal to the pressure in the left lateral position. In *all* the other cases it is much lower. In Case A (Experiment 6), in which Moritz found in himself the pressure in the left lateral position to be 19 cm. H_2O, in the right it was only 5 cm.! This is a significant difference. The fact that the pressures found in these two positions in Case C were the same, and very nearly the same, as that found when on the back is of much more importance than the absolute values.

Moritz does not attempt an explanation of the figures obtained in this case, which he describes as an isolated exception. Isolated exceptions, however, are of great value; they are indications of the real state of affairs. They probe generalizations, and if the generalization takes no account of them, or cannot explain them, or is inconsistent with their existence, they show the generalization is invalid—that the rule is no rule. Provided one can accept these figures as really showing the pressures existing in the three positions—and Moritz had so much practice and his technique was so good that I think one can accept them, for he says not a word to lead one to suppose they were erroneous—what explanation of them can be given other than that in this case the pressure in the stomach was increased, and increased by an increased tonic contraction of the abdominal wall and thoracic diaphragm—the only possibility? For just as it is easily intelligible that when the tone of these musculatures is low, as it usually is in the lateral positions, that the weight of the liver should cause an appreciable difference in the pressure found in the stomach, according as to whether the liver is situated above it (as in the left lateral position) or below it (as in the right), so it is obvious the effect of the liver weight will become less and less important as a factor in the stomach pressure as the tension of these musculatures is increased.

Moritz, who believed the pressure in the abdomen in the non-pregnant is due to the visceral weight, and not at all, or scarcely at all, to the tonic contraction of the enclosing musculatures, did not attempt to explain the increase, or tendency to increase, in pregnancy.

as shown in these cases—he passes it by; and Hörmann, in 1905, referring to them, says the increase Moritz found was at most quite unimportant and so dismisses it. It is especially noteworthy, says Hörmann [8], that in consequence of the extraordinary elasticity of the abdominal wall musculature, very considerable increase in volume of the abdominal contents, both physiological, as occurs on ingesting large meals and in pregnancy, and pathological, due to slowly growing tumours and gradually increasing ascites—may occur without causing any tension of the abdominal wall musculature, and therefore without producing a rise of pressure within the abdomen due to this cause. He tells us he has made numerous observations of the pressure within the rectum, "in lying-in women, individuals with flat abdomen, in late pregnancy, in patients with large tumours—e.g., considerable ascites"; and that he "found no difference in the pressure which was not completely explained by the altered statical conditions." He says: "Even if I found in the latter months of pregnancy in the erect posture average values of from 30 to 34 cm. H_2O, and on the other hand, in lying-in women and individuals in whom the abdomen was flat and lax, values of only 16 to 18 cm. H_2O, this difference is adequately explained by the weight of the uterus with the liquor amnii and fœtus bearing on the rectum in the former cases, without a tension of the abdominal wall participating in its production. Even with quite large tumours—e.g., ascites (due to carcinoma of ovary, 20 cm.), large fibroid reaching to the navel (22 cm.), ovarian tumour to the costal arch (26 cm.)—I found no higher pressure values than Schatz found in very many measurements on normal individuals in the rectum when quietly standing."

That increase in volume of the abdominal contents may occur without increase in pressure has been shown by many writers.[1] We may allow that the ingestion of food in moderate quantities does not cause a rise of pressure, either within the stomach or between it and adjacent organs. Indeed, Moritz found on two occasions an appreciable fall (1 to 2 cm. H_2O and 3 cm. H_2O). But we must remember that even slight changes in the posture of the body, changes in attitude—e.g., flexion and extension of the spine, elevation of the chest—cause considerable changes in the stomach pressure even when its volume is constant. But we may admit that in the stomach no great rise, or no rise, or a slight fall, occurs in the pressure when the

[1] *See* Braune, 1865 [1]; Weisker, 1888 [22]; Kelling, 1895 [10]; Moritz, 1895 [12]; Hörmann, 1905 [8], Hertz, 1911 [7].

stomach volume is being moderately increased, especially in people with flat abdomens; and that this fall is caused by a reflex diminution in tone of the abdominal wall muscles and diaphragm. And it has seemed to me the same may happen in early pregnancy; that in the early stages the enlarging of the uterus is associated also with a diminution in tone of the enclosing musculatures, with a fall of intra-abdominal pressure, occurring especially at night. In this way I have explained to myself the morning sickness of pregnancy; for such a relaxation would affect the epigastric viscera, permitting a nocturnal dilatation of the stomach, and probably interfering with the normal functioning of the liver. But the admission that this is so does not show the intra-abdominal pressure is not increased, and maintained increased, in mid- and late pregnancy. In respect to this non-increase of pressure in the stomach (and epigastrium) on taking food, Kelling (1895) [10] makes an interesting and enlightening observation. We can understand, he says, that the pressure in the rectum need not necessarily increase when we load the stomach with food; since it is one of the simplest of hydrostatic laws that the pressure on the floor of a vessel is not dependent on the mass of contents—e.g., water—it contains, but only on the vertical distance of the floor from the surface level of the contents.

The earlier writers laid great stress on the observation that the pressure in the rectum is such as to support a column of water as high as the highest part of the abdominal cavity for any position: and, since they said the specific gravity of the collective viscera (with contents) equals approximately that of water, they argued that the pressure in the rectum is due to the visceral weight; and that the belly wall musculature plays no part in its production. But the pressure in the rectum in the lateral position and in the supine position cannot be explained on that hypothesis; nor can the fact that the pressure in the rectum in these positions is greater than the pressure in the stomach in the right lateral and supine positions respectively. And, it is obvious if the pressure in the rectum, in the erect posture, is due to the weight of the visceral column, that however much the visceral mass should increase, the rectal pressure should not vary unless the visceral height also varies: that change in the pressure should correspond with change in the height of the visceral column—i.e., with the position of the diaphragm. Indeed, Weisker attributed the respiratory excursions of rectal pressure to this change in level of the diaphragm—a conception unpleasantly illuminated by finding that on abdominal inspiration the rectal pressure rises as the diaphragm descends, and the height of the visceral column is reduced [22].

The application of Kelling's enunciation, all unconsciously made,[1] enlightens Hörmann's position with a lurid glare, rendering conspicuous his hidden contradiction. It is clear Hörmann's explanation of the increased pressure values found in the rectum in pregnancy is invalid. The increase cannot be due to the increased visceral weight, for the specific gravity of the pregnant uterus with contents, like that of other viscera, is approximately that of water, and the level of the diaphragm is not so much elevated in pregnancy to account for it. According to Hörmann's figures, the height of the visceral column would have to be increased 12 to 18 cm., the diaphragm to be raised more than 4 to 7 in., to correspond with it. Moreover, the variations found to occur in different pregnant women are not explained by a variation in height of the visceral column, or indeed by a difference in weight or of volume of the visceral mass. In some cases the pressure is greater than in others; is, for example, greater as a rule in primi-gravidæ than in multi-gravidæ, in spite of the child generally being larger and heavier in the latter. And in others, even in primi-gravidæ, the pressure is not greater, or not much greater, than in the non-pregnant, although the pregnancy is advanced and in other respects quite normal (as in Cases 2, 3, and 4 of the records submitted). Further, in the same patient, the rectal pressure is greater when sitting than when standing, as Schatz's cases show (so also Cases 9 and 10 of my list), in spite of the fact that the height of the visceral column remains approximately the same; or, indeed, on account of the flexion of the spine and the rotation forwards and upwards of the pelvis which occurs on sitting, is probably reduced. Schatz's explanation of this—that it is due to the pressure upwards upon the soft parts occluding the pelvic outlet by the surface on which the individual is sitting—will scarcely find credence.

Just as Hörmann found a difference in the rectal pressure before and after labour, so he found a difference (but a lesser one) before and after removal of the fibroid and ovarian cyst in the respective cases referred to. The same criticism advanced against his explanation of the former applies also to the latter. It is plain, Hörmann's explanation of these values contains a contradiction. Similar increase in volume or in mass of the abdominal contents should result in similar pressure values, but they do not. It therefore follows that the pressure values are not due, at least by itself, to the visceral weight, but that some other factor is involved in their production. And the only other possibility, the only other factor, is the force exerted by the " tension " of the abdominal wall and other musculatures enclosing the abdomino-pelvic viscera.

---

[1] For, although Kelling [11] was forced later (1903) to admit, by his own reasoning, that the muscular walls of the abdominal cavity do participate in the pressure production, at this time (1895) he held that the pressure in the rectum is due to the visceral weight alone and not to the belly wall musculature at all.

And in spite of the indisputable evidence that increase in volume of the viscera may occur without increase of pressure within the abdomen, there is also clear evidence in the literature (to which I must refer readers) that a rise of pressure occurs when the distension exceeds certain limits. This, after all, is easily intelligible: theoretical reasons alone would lead us to suppose it occurred. Even although it be admitted that a relaxation of the abdominal wall (and thoracic diaphragm) occurs when food is taken into the stomach, it is not to be supposed that the relaxation is complete, that the tonic contraction of the enclosing musculatures has disappeared. And even though a fall in pressure occurs immediately after taking moderate quantities of food, it cannot be supposed the fall long persists, but that the pressure gradually and soon rises to its ordinary level. The feeling of emptiness immediately after a small meal, which often surprises one, and which is perhaps due to an accompanying relaxation of the belly wall muscles, does not last long. It is replaced by a feeling of satisfaction or sufficiency, due, so it seems to me, to the passing away of this partial relaxation. Nor can it be thought this relaxation would go on, that the tonic contraction would become lesser and less—*ad infinitum*—if the visceral mass should progressively increase. For, if so, and if the enlargement of the abdomen became permanent, as in corpulent people, one would expect the abdominal wall to have become weaker and weaker, instead of stronger and stronger, as we know it does. That it is stronger in such individuals (other things being equal) clinical examination shows. Presumably this relaxation has a limit. At least, in the case of the stomach, a stage is soon reached in which definite sensations of fullness or of distension are produced, which clearly are not altogether due to distension of the stomach itself, since they are relieved by loosening the clothes—e.g., by undoing a button—or by altering the posture. In the case of pregnancy, the relaxation of the abdominal wall (and thoracic diaphragm) probably associated with the enlarging uterus also has a limit. That limit is reached when the uterus, entering the abdomen, begins to bulge the abdominal wall. From this time onwards the pressure not only in the pelvis but in the abdomen above the uterus begins to rise, and although in the latter months of pregnancy it may begin to fall, it is maintained increased in many cases throughout that period.

III.

So far we have seen the pressures in the rectum found in pregnant women indicate the pressure in the abdomen—and above the uterus—is increased in pregnancy. The view that these are due to the mere weight of the enlarged uterus has been shown to be untenable; for the arguments on which this view is based are invalid. The remarkable pressure found in the rectum in the lateral position, the patient lying at ease, is clearly irreconciliable with the hypothesis that the rectal pressure is due in this position to the uterine weight. It shows the viscera are thrust into the pelvis with a force greater than in the non-pregnant in the same position, and is only to be explained by supposing that the tonic contraction of the abdominal wall and thoracic diaphragm is increased. The figures given by Moritz for the stomach pressure in pregnancy indicate this is certainly so—at least in some cases. And if the figures from all his cases are not sufficiently high at once to substantiate our opinion that an increase in tone in pregnancy is the rule, they do not render that opinion untenable—as we shall see. Many observations might be brought forward in support of this conception: for instance, the relation of pregnancy to heart disease; its influence in pneumonia; its remarkable effect on many multi-gravidæ, who say they never feel so well, and certainly who never look better, than when they are pregnant. These well-recognized relations are only to be explained by supposing the intra-abdominal pressure is increased in pregnancy. But interesting and important as they are, I leave them aside to-night; for the proof that the intra-abdominal pressure is increased in pregnancy does not rest with them, but with the condition in pregnancy of the muscular sheets enclosing the abdomino-pelvic viscera. For, if in the non-pregnant the intra-abdominal pressure is due mainly to the functioning of these musculatures, and if the visceral weight, though subsidiary, is yet an unimportant factor, then, in pregnancy, if the intra-abdominal pressure is persistently increased, and is due to the increased functioning of these musculatures, and not merely to the increased visceral weight, these musculatures should show some structural change. And so they do!

A comparison by palpation of the pelvic floor musculature in women with flat abdomens, and in those who are pregnant, reveals this musculature becomes hypertrophied in pregnancy. The statement that this is so has appeared in my writings [15], but as far as I know, has neither been corroborated nor refuted by contemporaries. Dickinson [3], however, in 1889, made the same statement, but drew no conclusion from it. Yet it is an important observation, for if the pelvic floor resists the down-thrust of the pelvic viscera, its hypertrophy can only mean that this down-thrust is increased—that the intra-abdominal pressure is increased in pregnancy. The anterior parts of the levator ani muscles—those which form the lateral and posterior boundaries of the aperture in the pelvic floor through which the urethra, vagina, and rectum pass to quit the pelvis [17]—are easily felt to be greatly strengthened by a considerable increase in mass in pregnancy. In virtue of their functioning, not only are these visceral canals occluded by being compressed against the pubic arch in front, but the aperture in the pelvic floor through which they pass—conceived by so many to be a patent foramen—is itself occluded, and thus visceral extrusion—more likely in pregnancy because of the increased pressure within—is prevented. Thus is their hypertrophy easily intelligible. And of equally important significance is the remarkable development of that part of the pelvic floor musculature arising from the ischial spine—the posterior part of the ilio-coccygeus and adjacent part of the coccygeus; the part, indeed, which, so thin in non-pregnant women, has been denied any functional value. This can now be felt, especially in primi-gravidæ, as a thick, fleshy mass, painful on squeezing between the vaginal finger above it and the thumb on the skin below it, and hardening on coughing, indicating its nature. It can be traced from its origin, the ischial spine, inwards to its insertion, the coccyx and ano-coccygeal ligament. With its fellow of the opposite side, and the osseo-fibrous raphe between, it forms a strong and broad sling, passing in a gentle curve from side to side of the pelvic outlet. Situated far behind the line, through which gravity acting on the enlarged visceral mass in the pregnant woman must fall, its curvature is placed in a plane which passes obliquely upwards and forwards through the transverse diameter of the brim, approximately at right angles to the brim. Clearly, it is especially adapted to resist efficiently the pressure impulses with which the whole uterus, enlarged by pregnancy, is thrust downwards and backwards towards it from the abdominal wall, as occurs with every movement, every respiration, of the woman.

It may be supposed, this hypertrophy is due to the progressively increasing weight of the uterus, which at term is considerable. But we find the muscular development corresponds, not with such increase of visceral weight, but with increase of visceral pressure. Thus, the hypertrophy is best marked in young, strong, robust primi-gravidæ—in individuals, that is, in whom the whole body musculature is well developed. It is not so well developed in primi-gravidæ who are not physically strong, nor is it so conspicuous in multi-gravidæ, although the child is often larger, and the pregnant uterus therefore heavier. And it is just in the strong and well-developed primi-gravidæ that the highest pressure values are found, as a comparison of Cases 1 and 4 of my list shows.

In the case of the abdomen a recognition of the state of its enclosing musculatures—the abdominal wall and thoracic diaphragm—is more difficult, for one cannot palpate them in the same way as in the case of the pelvic floor musculature; one cannot arrive at a very definite opinion as to their thickness, and in the case of the diaphragm palpation of any kind is impossible. But a consideration of their condition in pregnancy, and a correct interpretation of this condition, are highly important. It is clear from inspection of the pregnant abdomen, especially near term, that a very great change has occurred in the abdominal wall. Two phenomena stand out for consideration: (1) The increase in superficies; and (2) the separation of the recti.

The increase in superficies of the abdominal wall affects all its muscles; the increase occurs not only in the transverse circumference, but measurements easily show the vertical arc has increased, that the recti have become longer. The difference in girth of the abdomen at the level of the umbilicus in late pregnancy and, say, three weeks after confinement appears from my figures to be about 7 or 8 in.; but much depends on the condition of the abdomen at the time of the second reading. The greatest difference in my series occurred in the second case of toxæmia of pregnancy: the difference in girth two days before and eight days after labour was 11 in. But it may, of course, be much more. In cases of twin pregnancy, for instance, the abdomen may measure more than 40 in.; in one of my private cases it reached 45½ in. Subsequent to labour a very considerable diminution had occurred. From the few cases in which I measured the length of the recti muscles before and after labour it is clear they may increase as much as a third of their original length during pregnancy (*see* Case 9), although often it is much less than this.

Whether the recti abdominis muscles are hypertrophied or not, they are certainly very well developed in pregnant women; and the suggestion is they are hypertrophied. Indeed, there is very good reason to suppose this is so. It is difficult to believe their increase in length is due to passive relaxation, for that would mean their functional capacity was reduced; whereas, owing to the marked increase in weight of the body, and the advance of the centre of gravity due to the protrusion of the abdomen, a greater work for the recti becomes necessary for the maintenance of equilibrium. Schatz found that the pressure in the rectum in the erect posture was increased when the individual inclined backwards, but fell on bending forwards. The increased pressure in the former position can, I think, only be explained by an increased action of the recti. One has but to stand upright and palpate the recti muscles (even through the clothes) to feel that they distinctly increase in hardness when one inclines backwards. Similar palpation of the abdominal wall outside the recti shows no such increase. And, as is well known, the carriage in late pregnancy is altered in this way.

The recti, of course, are mainly concerned with the body equilibrium, but they cannot but affect the pressure in the abdomen when this is full; and especially must they do so in pregnancy, when the visceral mass is greatly enlarged by the enormous growth of the uterus. Clearly, they will do this most in extended positions when they are stretched, as when the individual is standing erect, or lying supine. But in flexed positions of the body, as in the lateral or when bending forwards, they will have less effect, because their origins and insertions are nearer each other, and a passive shortening of the muscles occurs. The abdomen bulges, it is true; but this, whilst it causes a lengthening of the transverse muscles of the abdominal wall, causes the vertical to become less. The strange and unexpected increase in the rectal and gastric pressures found in the supine compared with the lateral position (in the case of the stomach, with the right lateral) seems to me only explainable by the effect the supine position has in increasing the tension (i.e., the tone) of the recti. This occurs in the non-pregnant as in the pregnant, but the relative increase is, in most cases, much greater in pregnancy.

We are here on the brink of a most important discovery: that the active elongation of a muscle, due to its being stretched, is associated with, or causes an increase in tension or tone (an increase in tonic contraction) of that muscle. The increase in tone of the recti in the supine position compared with that in the lateral, indicated by increase in pressure, can only be accounted for by the increase in length of the recti the supine position causes. For there is no physiological reason why the pressure should be greater in the supine over and above that in the lateral position, such, for instance, as there is when the erect posture is assumed,[1] and examination of the limb muscles confirms this opinion. The tone of the biceps of the arm (as shown by palpation of its tendon) is greater when the arm is in a position of passive extension than when in one of passive flexion. The same is found in the case of the hamstrings. A good example is the pectoralis major. When the muscle is palpated in the supine position, the body and limb being supported completely from below (so as to eliminate the effect of gravity), the tone or tension of the muscle is felt to be distinctly and very much greater when the arm is in a position of passive abduction (in which case, of course, it is actively elongated and its fibres stretched), than when in a position of passive adduction (when its muscle-fibres are very much shorter). Obviously this—for us—is of profound importance.

With the knowledge that the recti are considerably elongated (stretched) in pregnancy, that there is above this a need for their greater functioning, and that considerable variations in their length passively occur—with change of posture—and especially that during the long hours of night, generally spent in the lateral position, their length, and so their tone, is diminished—conditions which are the essentials for hypertrophy—we cannot but suppose their hypertrophy occurs. Indeed, that the recti are not hypertrophied in pregnancy is unthinkable.

The other muscles of the abdominal wall—which after all are those mainly concerned with the pressure conditions within the abdomen, as their phylogeny shows—are the two obliques and the transversales: but, for the sake of simplicity, we will omit the obliques and confine ourselves to the transversales. These, which extend throughout the abdominal wall, from the pubes to the ensiform cartilage, always act together; and the tension caused by their contraction becomes effective, since they are united anteriorly by the median aponeurosis, a strong fibrous membrane situated behind the recti, and forming part of the sheaths of those muscles. The two transversales and the median aponeurosis collectively form a compressing mechanism, embracing the visceral mass; for they consist of transverse fibres, and can have no other effect than to compress the visceral mass and to cause a pressure within the abdomen—they cannot, for instance, have any direct effect on the maintenance of body equilibrium, like the recti have.

---

[1] Necessity for increased supply of blood to the heart, so that an adequate blood supply to the brain may be maintained in spite of the effect of gravity.

What is the condition of the transversales in pregnancy? Obviously, they are not in the same condition as before. Their muscle-fibres have become at least longer; for the width of the diastasis between the recti does not account for the difference in girth between the pregnant and non-pregnant abdomen. My measurements show that at once. But to understand their condition we must inquire into the nature and cause of the separation of the recti—the second phenomenon we mentioned, spoken of as a physiological separation, and so dismissed by writers. This separation occurs, as everybody very well knows, in the great majority of pregnant women who reach term. It is only found to any marked extent in the later months of pregnancy; and in some cases it is much less than in others.[1] And it is more or less peculiar to pregnancy, or is associated with pregnancy; if present in a non-pregnant woman, that woman has previously been pregnant. Eccles [5] says: "Rarely an abdominal tumour may produce a like separation in the male sex." If so, it may similarly be produced in nulliparous women by tumours: but if it occurs in such cases, the separation must be so small that it is not comparable with the condition in pregnancy. But I am very sceptical of these reputed cases; the only other condition besides pregnancy in which I know it to occur is in early infant life.

Subsequent to pregnancy the separation of the recti usually disappears; and even though the contents of the abdomen may later become so much increased that the circumference of the abdomen exceeds the average girth of the pregnant abdomen at term, it does not necessarily recur. In a woman I examined, past middle age, in robust health, and who had had several children, the circumference of the abdomen was 40 in.—in excess of the average girth in late pregnancy—yet no separation of the recti was present. She was a very vigorous and corpulent person. I venture to say this is the normal condition in all healthy corpulent people. Separation of the recti does not occur as a result of corpulency—that is, of an increase in volume of the visceral mass, equal to or even greater than that occurring in pregnancy.

This, at first sight, extraordinary difference in the effect produced by enlargement of the visceral mass in pregnancy and corpulency is, I believe, to be explained quite simply—by the time taken by the increase to occur in each case: difference in content (fat and pregnant uterus) cannot be supposed to explain it. For whilst the deposit of fat—in the mesenteries, renal regions and subperitoneal tissues—is a slow process, taking perhaps one or two years to occur, in pregnancy the increase in volume of the visceral mass caused by the growth of the uterus is much more rapid, the great increase (beginning, say, at the end of the third month) occurring in about six months only or even less. So also the relatively slow growth of tumours, such as fibroids and ovarian cysts, explains the usual non-separation of the recti—the muscles of the abdominal wall have time to adapt themselves to the increase; whilst, on the other hand, the rapid enlargement of the abdominal viscera in infants, caused by the taking of food (milk) and the increase in mass, and so in volume of the visceral tissues themselves, associated with digestion, &c., coupled with the sudden descent of the diaphragm becoming more and more permanent (due to respiration), seems to explain the separation, such as it is, seen in them.

---

[1] The greatest separation I have seen was in the case of twins already referred to; here it measured 5½ in. But in my list the largest was 3 in.

Since in corpulency, as in the non-pregnant with flat abdomen, non-separation of the recti is the normal condition, the separation in pregnancy, though usual in that state, is not normal: it is pathological, not physiological.[1] Clearly, the recti themselves can have nothing to do with it, for when their contraction is increased, as when a woman lying supine raises her head, they tend to come together and to reduce the diastasis. The separation is due to a stretching of the linea alba, the median part of the aponeurosis uniting the flank muscles. Obviously, the separation is associated with the pull of the flank muscles: it is associated with the bursting effect caused by the enlargement of the visceral mass: it is evidence the flank muscles resist the distension.

Now, in corpulent people who are robust—i.e., in whom the whole muscular system is vigorous (the usual condition)—it must, I think, be allowed the transversales are hypertrophied. The muscle-fibres are clearly much longer than in slim individuals; palpation reveals their excellent functional condition—the hardness of the flank muscles is evident when they are made to contract by getting the individual, lying supine, to raise the head and shoulders. Moreover, measurements of the pressure in the rectum show the intra-abdominal pressure is much increased—an increase which cannot be explained by the increase in visceral weight. Case 5 on my list is the record of a young woman, aged 19, exceedingly strong and very stout. She was, it is true, eight to ten weeks pregnant, but this cannot be taken as explaining the very high pressures found in the rectum, which in the left lateral position registered as much as 20 to 22 mm. Hg. A comparison of her record with that of another primi-gravida (Case 11), not stout, but a few weeks pregnant, shows a very marked difference in the pressures found, indicating the increase of pressure present in robust, corpulent individuals. All such corpulent people—and in the absence of pregnancy—show a well-marked hypertrophy of the pelvic floor musculature: that is quite a common experience. Obviously, too, from what we have already said, the recti must be hypertropied in such individuals. And there is no difficulty in admitting the transversales are similarly hypertrophied. It is impossible, then, to imagine that the increase in volume of the visceral mass—from the slim to the obese—in individuals leading active lives is associated merely with a gradually increasing relaxation of the transversales; that the muscles in the latter state have only been and only are passively relaxed. On the contrary, we see the very opposite has occurred: with the gradual deposit of fat within the abdomen the muscles have become hypertrophied.

---

[1] To say the separation of the recti is physiological is to beg the question. We might just as well say disease and death, because usual, are physiological.

An adequate relaxation, occurring for a sufficient time each day—i.e., during the twenty-four hours—is, as we have said, necessary for the hypertrophy of muscle—for any muscle. Hypertrophy occurs because the muscle has to do more work, or its stimulation is greater; but this work or stimulation must not be continuous, it must be intermittent, and in the intervals a sufficient relaxation must occur. This is an essential condition. It is true of every tissue in the body; without adequate relaxation, atrophy or degeneration ensues. The fact that an uncomplicated hypertrophy has occurred in the transversales in corpulency is proof that the muscles have been relaxed sufficiently for a certain period during each day (i.e., at night), whilst the condition has been arising. And we have but to think of the direct effect of the elongation of the muscle-fibres on their tone, to which we have referred, and which is true of all striated muscle—an elongation which must necessarily occur in the transversales with the gradual increase in volume of the visceral mass, due to the deposit of fat—to perceive the mechanism of their hypertrophy. It is caused by the gradual increase in volume of the visceral mass, which by stretching the muscle-fibres of the transversales (i.e., increasing their length) determines their increased contraction (tonic and other) during the active part of each day; but which occurs so slowly that it does not interfere with an adequate relaxation during the resting part, that is, during each night.

But the condition in pregnancy is different. The separation of the recti shows at once that the muscle-fibres of the transversales have not passively relaxed as the contents of the abdomen have been increased by pregnancy (as Hörmann and others would have us believe). But it shows much more than this. It shows these muscle-fibres have not adequately relaxed even for a sufficient time each day (twenty-four hours)—at least during the period that separation of the recti has been occurring—to ensure their uncomplicated hypertrophy. They have not relaxed as much as they do in the transition from the slim to the corpulent state! They have not only not relaxed, they have actively resisted the distension; they have been forcibly stretched by the increase in volume of the visceral mass, caused by the rapid rate in growth of the pregnant uterus. For if these transverse fibres had been able to relax sufficiently even for a part of each day, not only they, but their aponeurosis would have hypertrophied. During such relaxation, their pull on their median and anterior aponeurosis would have been lessened: during their increased contraction (during the active parts of the day) their aponeurosis would have been able to withstand the strain the muscle-fibres cause. Thus, no separation of the recti would have occurred. But if the muscle-fibres do not sufficiently relax at any time, if they continuously resist the distension and are consequently forced to stretch—because the distension is progressive—the whole fibro-muscular mechanism suffers, a stretching of the whole occurs, and the separation of the recti becomes intelligible.

When a muscle becomes continuously stretched it undergoes degeneration—regression (Bland-Sutton); it becomes atrophied; not only it, but its tendon or aponeurosis. That such actually occurs in the flank muscles of the abdominal wall, during and because of pregnancy, is shown by the condition of the abdominal wall after pregnancy: it requires no further remark. So, too, the bulging of the parts between the recti during pregnancy, when the head is raised from the couch, shows the thinned-out expansion is incapable of withstanding the increased pressure within, caused by that movement. So also the similar bulging of the muscle outside the recti, so often to be seen with the same movement, is evidence that the muscle-fibres themselves have suffered. These conditions, however, are not seen so much in primi-gravidæ as in multi-gravidæ, in whom the muscles have already suffered. Moreover, they are late manifestations, not early ones, of pregnancy.

Thus we are forced to regard the transversales in pregnancy, at least during the latter months, as undergoing an atrophic or degenerative change: theoretical considerations and actual experience show it is so. The muscles, clearly, are not in a state of uncomplicated hypertrophy as they are in corpulency. Nor are they capable of the same amount of increased contraction. This is indicated by the pressures obtained in the rectum produced by straining, and also by lifting weights. One cannot but be surprised by the relative low values obtained in pregnant women, as compared either with the non-pregnant with flat abdomen, or in those who are fat. (Compare Case 9 with Case 11, in my list.) These differences are, it seems to me, only to be explained by a loss of strength in these muscles occurring as pregnancy advances. But with this their tonic contraction—the contraction that persists during rest—is increased; the same two cases show the difference well. The increased pressure is not caused by the recti alone, for it is present in the left lateral position, in which the recti are relatively slack.

This increase in tonic contraction, *the contraction of rest*, the effect of which is to maintain a correspondingly high pressure within the abdomen as long as the increase in tone continues, is due to the continued stretching of the muscle-fibres which, as we have seen reason to believe, even persists, at least to some extent, during resting conditions, preventing an adequate relaxation. That this is so becomes clear when we reflect on the rapid rate of increase of the pregnant uterus, and remember that this is continuous. It does not cease until the end of pregnancy; and whether we consider its effect on the transversales during resting conditions or during activity, these muscles are alike in evil case. If there were reason to believe fœtal growth ceased or diminished during rest, that is, during sleep, it would be different. But, on the contrary, the probability is that it is just at this time considerable growth occurs; for then the pressure within the woman's abdomen, although high, is yet lower than at all other times. The fact that children are generally larger in multi-gravidæ, in whom the intra-abdominal pressure is less, than they are in primi-gravidæ, in whom this pressure is greater—because the muscles in the former are not in such a good functional condition, having been previously stretched and so damaged—supports this opinion. It is reasonable to suppose fœtal growth can occur more readily when the pressure about the fœtus is less than when it is greater.

If this is so, and I know of no reason that indicates the opposite, we have a ready explanation of the cause of the persistent increased tone of the transversales. For when the uterus has grown so large as to have begun distending the abdominal wall, its continued growth, especially at night, will continue to keep the transversales on the stretch. In spite of the relaxation that should occur during sleep, the continued growth of the uterus takes up, so to speak, the spare room so afforded, and prevents the pressure falling: by keeping the muscles on the stretch it maintains the pressure high. We have already seen that in the lateral position (the usual one in sleep) the length of the recti muscles is reduced, and that this position causes a bulging of the belly wall anteriorly, with an increase in length of the muscle-fibres of the transversales. We have already referred to the direct effect of this elongation, this stretching, on the tone of the muscle-fibres. All these conditions taken together explain the condition of the transversales.

Even if it be supposed that the transversales do become sufficiently relaxed at night, it is clear they must be continuously stretched during the day—the fœtus grows during some time or other. When the woman is up and about, it is clear the conditions must be worse for the transversales than during the night. In the erect posture, the girth of the abdomen is greater than when lying down. Olshausen [14] has made measurements, and finds that in primi-gravidæ an increase of 4 to 7 cm. occurs, whilst in multi-gravidæ it is 10 cm. Thus it is clear the muscle-fibres of the transversales are more stretched when standing than when lying down; so also, on account of the flexion of the spine, they become even more stretched in the sitting posture: thus is their tone reflexly increased. Obviously, if the fœtus grows most during the day the transversales must suffer. It is, of course, well known that in spite of the rest during sleep, muscles may not be able sufficiently to recuperate to withstand the effects of overwork during the day: the stretching of the tibialis posticus as the result of prolonged standing, with the production of flat-foot, is perhaps the best example I can give.

Thus, in pregnancy, we have a condition in which the transverse fibres of the abdominal wall, like the recti, should result in an uncomplicated hypertrophy: but which, on account of the rapid fœtal growth, is interfered with, and results in a complicated hypertrophy—a hypertrophy in which the tonic contraction is persistently increased, and in which consequently a degeneration ensues. Thus the pressure conditions in the normal are reversed. During rest the pressure remains high, when it might with advantage be low; during movement, when the pressure usually rises very considerably, it does not do so. The condition seems to be one of spasticity, allied to such as occurs in spastic paraplegia, in which the muscles (of the legs), though continuously and excessively contracted—causing the rigidity—undergo an atrophic change, which if the lesion persists at length leads to their complete atrophy. In paraplegia, the condition presumably arises from the interruption of inhibitory discharges from the higher centres to the nerve cells in the cord supplying the leg muscles; in pregnancy, the condition of the transversales is due to the persistent stretching to which they are subjected, caused by the progressive and rapid increase in volume of the visceral mass.

Here, too, must be mentioned the influence caused by taking food. The additional increase in volume of the visceral mass so produced is probably of real importance. Whilst it has been shown that reflex relaxation of the abdominal wall (and thoracic diaphragm) occurs when the non-pregnant individual takes food in moderate quantities—that is, in individuals in whom a spastic condition of the transversales does not obtain—this has not been shown to occur in pregnant women. Such relaxation may occur. We can readily admit it does so during the first three months of pregnancy, and possibly it does so in the last. But I should like to know it does so during the other five months. That ingestion of food, in anything like large amount (i.e., large in volume), should cause anything but an increase of pressure, would surprise me. It is difficult to believe that even a moderate amount would not cause a rise of pressure. I cannot but think that if the amount taken be excessive, and that if this be often repeated (and some pregnant women have big appetites), the resulting increase in volume of the visceral mass would cause such a rise of pressure as to be the turning point of a pregnancy, normal in all respects as we now speak of it, into an abnormal and dangerous state.

There remains yet to consider the thoracic diaphragm. That the superficies of the diaphragm is increased in pregnancy is shown by the enlargement of the thoracic base, the elevation of the central tendon, the increased bulging of the cupolæ into the chest. My measurements show a considerable increase in girth of the thoracic base has occurred; but it is not so marked as the increase at the level of the umbilicus. The cases are, however, few; 3 in. and 2½ in. occurred in Cases 6 and 9; 5 in. was the difference in Case 19—the second case of the toxæmia of pregnancy. I have not made any measurements as to the height of the diaphragm during and also after pregnancy, as I might have attempted. But Stengel and Stanton [21] have shown that the heart, and so the diaphragm, are pushed up in pregnancy—more so in primi-gravidæ than in multi-gravidæ. It is therefore clear that the muscle-fibres of the diaphragm have become longer. To suggest that this is due to a passive relaxation, if the arguments advanced in the case of the transversales be valid, is absurd. Indeed, that the thoracic diaphragm has passively relaxed is unthinkable. The only reasonable condition to expect in the diaphragm—for as far as I know no post-mortem examinations have been made on pregnant women in this respect, and so no direct comparison with the non-pregnant is possible—is either that the diaphragm is hypertrophied, or that it has also undergone a spastic change like the transversales, in either of which its tonic contraction would be increased, but more so in the latter than in the former—but for our point of view it does not matter which has happened.[1]

There can, I think, be no doubt that in corpulent people the diaphragm is hypertrophied: when it becomes weakened in such cases we see what happens—dyspnœa occurs. It is impossible to think but that the diaphragm is hypertrophied in singers, who are usually stout; but they do not expire with their diaphragms. The diaphragm becomes hypertrophied to resist the action of the hypertrophied abdominal wall. The mere lengthening of the muscle-fibres of the diaphragm, produced by increase in volume of the visceral mass, must result in their increased tonic contraction, and must cause an increased compression of the abdominal viscera pressing the epigastric viscera downwards, preventing or tending to prevent them rising into the chest. Obviously the diaphragm has to prevent the epigastric viscera from encroaching upwards into the chest.[2] We have already seen that the increased tonic contraction (spasticity) of the transversales results from a too great stretching of its fibres, which it resists. Clearly, it must tend to force the epigastric viscera upwards into the chest where the pressure is negative: it cannot force them downwards. If the diaphragm were not to resist this visceral ascent, the negative pressure in the chest would not be able to be maintained, and the heart and lungs would cease to function.

The enlargement of the thoracic base was supposed by Matthews Duncan to be primary, to be caused by the thoracic muscles so as to make room for the growing uterus, and so to prevent a pressure on the liver and other viscera. And Schatz thought the intercostal muscles hypertrophied for the same end. It is, of course, true that an expansion of the chest in the non-pregnant does cause the pressure in the stomach to fall; and if the expansion be made with the glottis closed so that no air can enter the lungs, the pressure in the stomach may become negative. And in the earlier months of pregnancy such an active expansion of the chest may unconsciously (reflexly) be made, and probably is made, by the individual to relieve the tendency of the abdominal pressure to rise; just as in ourselves it occurs when too large a meal may have been eaten: extension of spine and elevation of the chest into a more inspiratory position does relieve the unpleasant sensations of fullness. But it is impossible to suppose that this can go on *ad infinitum*. As we have seen, we have very good reason to believe the reverse is the case. The thoracic base is not only expanded by the muscles of the chest wall, but much more by the increasing volume of the abdominal visceral mass. It cannot be believed that this progressive increase can stretch the transversales and other flank muscles, as it obviously has done, and yet have no effect on the thoracic base. The marked widening of the costal arch, and the stretching of those fibres of the transversales which run from one side of it to the other behind the recti is evidence of the contrary.[1] The intercostal muscles hypertrophy because in the presence of such a mass in the abdomen it is more difficult to cause an entry of air into the lungs. They expand the chest laterally and antero-posteriorly, so that extra room may be afforded in these diameters now that the vertical is encroached upon. So also the tonic contraction of the diaphragm is increased for the same end—to limit the diminution in the vertical diameter.

---

[1] Since the printing of this paper I find a hypertrophy of the diaphragm in pregnancy has been observed. *See* Wood Jones, "The Functional History of the Cœlom and the Diaphragm," *Journ. Anat. and Phys.*, 1913, xlvii, p. 308.

[2] That the diaphragm does this in the non-pregnant see Halls Dally [2], Hasse [6], Keith [9], Wynter [21], and myself [18].

IV.

That the intra-abdominal pressure is raised in pregnancy, and in a very considerable degree, is clear from these considerations. The abdominal wall musculature and thoracic diaphragm, in virtue of their increased tonic contraction—a contraction obtaining quite apart from bodily movements, associated either with general activity or with visceral acts (straining, vomiting, and cough), and which is persistent during so-called rest—cannot but compress the viscera placed between them to an extent much greater than occurs in non-pregnant women under similar conditions. Even in corpulent, non-pregnant people it can be postulated quite certainly that the pressure in the stomach is greater than in slim individuals. Indeed, clinical experience itself furnishes an indication of this in the incidence of such conditions as ptosis and dilatation of the stomach, which are much more common in thin than in stout individuals. So much is this the case that whilst the former may be said to be predisposed to this disease, the corpulent, because of the increased tonic contraction of the abdominal wall and diaphragm, are safeguarded from it. An increased volume of the visceral mass alone would not cause this difference; it is the reaction of the muscles to this increase—their hypertrophy—which determines it. Clearly the tone of a hypertrophied muscle—the persistent contraction during rest—is greater than its tone when not hypertrophied. But in pregnant women we have an additional factor at play; we have an increase in the tonic contraction of the transversales over and above that due to its hypertrophy, an increase resulting from its spasticity, which only lessens as its degeneration occurs, and which, before this happens, must cause even higher values during resting conditions.

---

[1] It is significant to notice that here, in the normal, the median aponeurosis is so much reduced in width that towards the ensiform cartilage the muscle-fibres of the transversales, arising from one side of the costal arch, pass into the corresponding muscle-fibres arising from the opposite side without the intervention of fibrous tissue (Quain's "Anatomy").

I have thought long over the condition of the transversales in pregnancy, and believe the interpretation given of the separation of the recti is the true one. Such being the case, it is unnecessary for our present purpose to go further; it is unnecessary to make exhaustive examinations of the pressure in the stomach in pregnancy, for we have proof without that, that the pressure is raised in pregnancy. But this, no doubt, ought to be done; and I have no doubt whatever that the pressure found will be higher than in the non-pregnant, as Moritz's figures indicate.

But there are two sources of fallacy to be guarded against in reading the significance of such observations. Taking the pressure in the stomach is an unpleasant and trying business. I have had a tube passed into my own stomach (I tried to pass it twice myself but failed), and I can vouch for the unpleasantness.[1] But this is not all; the important point is, it upsets one. The nausea and vomiting cannot but affect the tone of the abdominal wall and diaphragm. One is likely, therefore, to get too low values. Even after the tube may have been down some time, and the patient has become somewhat accustomed to it, one cannot be sure that the values found represent the pressures under ordinary circumstances. As long as the nausea remains one cannot believe the tonic contraction of the enclosing musculatures is is as great as when no such influence is at play. This objection does not apply in the case of the rectum; a small bag in the rectum attached to a rigid tube in the anal canal causes very little, indeed no, discomfort, and does not upset one in the least. That this is so is shown by the earlier pressures found in the stomach of a single woman, pregnant, near term; the only case I have examined. She was aged 20, and expected to be delivered in a day or two. The circumference of the abdomen at its greatest part (2 to 3 in. above the umbilicus) was 42¾ in., increasing to 44 in. on inspiration. Considerable separation of the recti, 5 in. or more, was present. The patient was fasting—had had no breakfast. After cocainizing the pharynx a stomach-tube with two openings (but with no bag attached to its end) was passed. After the tube had entered the stomach it was connected with a mercurial manometer, and a little air was pumped into the stomach. The following pressures were found in the sequence given:—

---

[1] I have measured the pressure in my own stomach to verify Moritz's statement that the pressure in the left lateral position is so much greater than in the right. This I confirmed. From this little experience I learnt a "tip" of value. The tube should be passed in stages, and at each stage the patient should take a deep breath with the glottis closed. No air enters the lungs, but the increased negative pressure in the chest dilates the œsophagus, and the tube slips down well.

Sitting, leaning back	2 to 4	mm. Hg.
(The pressure gradually rose to 6 to 9 mm., when the heart beats were distinctly seen in the manometer)*		
Standing, the mercury falls to	2	,,
Flat on back	10 to 12	,,
Left side	12	,,
Back, again	14	,,
Right side	8	,,
Back	12	,,
Left side, heart pulsations visible, and respiratory excursions marked	12	,,
Back, faint indications of heart beat	12	,,
Right side	8	,,
,, "quite comfortable,"	6	,,
(Respiratory variations seen, but not heart beats)		
Left side	14 to 16	,,
Back	8 ,, 10	,,
Sitting upright	6	,,
,, and leaning forward, as crouching	10	,,
,, bolt upright	6	,,
Standing up	6 ,, 8	,,
Sitting down	8	,,

* The appearance of oscillations in the manometer, corresponding with the heart beats, shows quite clearly that the stomach wall itself was relaxed, and that the rise of pressure was due to an increase in tone of the abdominal wall and diaphragm.

It is clear from the figures, the earlier readings were too low; after some little time they became higher. But I could not be sure they were as high as they might have been. All the time the patient looked very bad, in spite of admitting for one reading she was "quite comfortable"; she suffered from almost continual nausea with occasional attacks of retching and vomiting, so it was not surprising to get such low values. But, in spite of this, there are indications that the pressures found were higher than usually obtains in the non-pregnant. The approximation of the values for the left and back positions, although greater than in the right, affords some evidence of this. The patient, too, was fasting; and the examination was not made early but late in the morning, nearer noon than ten. Moreover, she was mentally very distressed at her condition, wishing her life was at an end.[1]

But even admitting the pressures found in this case were not so much lower than under ordinary conditions, as I venture to suggest, there is another source of fallacy arising from the assumption one is only too liable to make—namely, that the pressures found in the stomach at term represent the highest pressures that may have existed during the preceding months of the pregnancy. This, however, is no such criterion. The separation of the recti is an indication that a degenerative change had occurred in the transversales, which is progressive until birth; and low pressures found in the stomach near term may easily be due to the resulting weakness of these muscles. Obviously a weakened muscle will stretch more readily than one not so weak; and a yielding due to stretching, just as that due to a passive relaxation, must be associated with a tendency of the internal pressure to fall.

We have already given evidence (*see* p. 310) that such weakness occurs; the fact that the pregnant uterus during the last month (usually last week or two) becomes lower in the abdomen is further evidence. The uterus is said to drop; but that is an inaccurate description. The lower uterine pole does not become lower; in primi-gravidæ it is already in the pelvis, and cannot get lower. What has happened is this, the abdominal wall has yielded—not relaxed, but stretched—and the fundus of the uterus has been pressed downwards and forwards by the diaphragm, causing an increased bulging of the abdominal wall. With this we cannot expect anything but a lowering of the pressure in the stomach. But there is another factor besides the progressive weakness and yielding of the muscles to be mentioned in connexion with this fall of pressure near term—the diminution in rate of increase of the uterine volume, or perhaps its decline. The former may occur as a slackening in the rate of fœtal growth; instead of increasing so much in mass, it consolidates; but the longer the pregnancy, presumably the larger the child. Whether an absorption of liquor amnii occurs cannot be stated; but it is quite clear what the effect of premature rupture of the membranes, so common in primi-gravidæ, must be. Clearly, it must cause a diminution in volume of the uterus, with a resulting fall in pressure in the visceral parts above. But these changes occur late in pregnancy. Separation of the recti may begin to show itself in the sixth month of pregnancy, or perhaps before; but it becomes most prominent in the last three months, especially towards the end. And it is during this time that the transversales show sign of weakness; they do not in primi-gravidæ as a rule show evidence of this before; it is only towards the end of pregnancy that the weakness becomes manifest. The reason of this is that whilst the uterus is growing actively, even the stretching of the abdominal wall does not suffice to allow a fall of pressure.

---

[1] This patient had threatened her life and was thought to have swallowed poison. That is how it was I came to pass the stomach-tube. It is obvious such a case cannot be relied on to give maximum figures.

Thus, we may well believe that, other things being equal, the pressure in the stomach in pregnant women, especially in primi-gravidæ, is not so high in the ninth month as before. In connexion with this, it is significant to notice that of the three cases in which Moritz examined the pressure in the stomach in the lateral positions and on the back, whereas the two which showed values little different from the non-pregnant girl examined in the same way were in the ninth month of their pregnancies, the one in which higher values were obtained, and which were all about the same (*see* p. 296), was in the eighth month of her pregnancy. She was, it is true, a secundi-gravida, whilst the others were primi-gravidæ. But does this render my argument invalid? I do not think it does so. This is but a single case, Moritz's isolated example; but it is significant. So also, in the case I examined, a great separation of the recti had occurred, and the patient was at term. Is it unreasonable to suppose that a month before the pressures in the stomach were higher than I found? Not only is such a supposition reasonable, but it is highly probable.

There are but two other points to notice, and the first is this: The spastic condition of the transversales which leads to separation of the recti and their own weakness must arise before separation of the recti begins—for this latter is a consequence of the former. We cannot believe that before this happens the transversales are not hypertrophied, that they have passively relaxed. As long as an adequate relaxation does occur—and obviously it must do so in the earlier stages of

Case	Patient	Age		Date of observation	Period of pregnancy	Fundal height	Pelvic measurements				Separation of recti	Girth of body at			
												Umbilicus		Thoracic base	
							Interspinous	Intercristal	Intertrochanteric	External conjugate		Rest	Deep breath	Rest	Deep breath
						in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
1	F. T.	—	Primigravida	Oct. 29, 1908	Near term	—	—	—	—	—	2	39	—	—	—
	,,	—	Confined Nov. 11, 1908	Dec. 10, 1908	—	—	—	—	—	—	¾	32½	—	—	—
2	E. P.	20	Primigravida	Nov. 5, 1908	8½ months	—	—	—	—	—	2½	36½	—	—	—
3	O. L.	23	Primigravida	Dec. 15, 1908	8½ months	12	10	11¼	12	7¾	1¾	33¾	—	—	—
	,,	—	—	Dec. 29, 1908	—	—	—	—	—	—	1¾	—	—	—	—
	,,		Confined Jan. 6, 1909	Jan. 22, 1909	—	—	—	—	—	—	¾	28½	—	—	—
4	K. F.	23	Primigravida	Dec. 29, 1908	Near term	12	9¾	11¼	11¾	7½	1	35¾	—	—	—
	,,	—	Confined Jan. 7, 1909	Jan. 20, 1909	—	—	—	—	—	—	Very slight sep.	30	—	—	—
	,,	—		Jan. 25, 1909	—	—	—	—	—	—	—	—	—	—	—
5	N.	19	Primigravida	Jan. 13, 1909	8 to 10 weeks	—	—	—	—	—	*Nil*	37	—	—	—
6	M. B.	18	Primigravida	Dec. 29, 1908	6 months	11	10¼	11¾	13	8¼	¾	33	—	—	—
	,,	—		Feb. 1, 1909	38th week	—	—	—	—	—	1½	35¾	36¼	31¼	31¾
	,,	—	Confined Feb. 17	Mar. 15, 1909	—	—	—	—	—	—	Scarcely any	29	29¾	28	28¼
	,,	—	—	Mar. 29, 1909	—	—	—	—	—	—	*Nil*	28¾	29¼	28¼	29¾
7	E. T.	22	Primigravida	Dec. 31, 1908	6 months	10½	8½	9½	11½	7¾	¾	30	—	—	—
	,,	—	—	Feb. 15, 1909	—	—	—	—	—	—	1 to 1⅛	31¼	32	29	29¼
8	D. R.	—	Primigravida	Jan. 20, 1909	6 months	12	9¾	11¼	12½	7¾	1½ to 2	35¼	—	—	—
	,,	—	—	Feb. 22, 1909	—	—	—	—	—	—	2	36¼	37¼	32	32
	,,	—	—	Mar. 29, 1909	—	—	—	—	—	—	2½	37¾	39¼	33½	34
9	P. F.	24	Primigravida	Feb. 1, 1909	—	—	10¼	11¼	12¾	7¾	2½	37½	39¾	32	32¼
	,,	—	In labour	Feb. 24, 1909	—	—	—	—	—	—	—	36¾	38	32½	33½

LENGTH OF PUBO-STERNAL LINE			PRESSURE IN RECTUM MEASURED IN MILLIMETRES OF MERCURY											Remarks
Pubes to														
Ensiform cartilage	Supra-sternal notch: Rest	Supra-sternal notch: Deep breath	Left side	Left side + coughing	Left side	Flat-back	Knee-chest	Left side	Standing erect	Standing + bending	Standing + lifting	Left side	Left side, straining	
in.	in.	in.												
—	—	—	22 24	152	—	—	−10 −4	14 18	30 36	22	52	–	36	Well developed. Placid; but bright
—	—	—	6	112	—	—	−2	8	22	10	64	—	52	Big boy, 7½ lb.
—	—	—	6	—	—	—	−8 −6	2	22 28	10	—	—	40	Left at own request, unconfined
—	—	—	2	—	—	—	−16	−2 0	22	6	22	10 2	72	Placid and dull; bad temper
—	—	—	4	—	—	—	−18 −16	10 8	30 32	10	32	22 18	92	
—	—	—	10	92	—	—	−2	8 6	18 16	8	32 34	6	—	
—	—	—	10 12	—	—	—	−6 −2	8	28 26	—	52 62	6 10	52	Not well developed, neurotic-looking; palate narrow and highly arched
—	—	—	12	—	—	—	3	8	20(?)	22	42 62	6	52 62	
—	—	—	18	—	—	—	4	12	30 32	—	24 22	—	52 62	Rectum loaded
—	—	—	18 22	—	—	—	4	—	30 36	—	—	20 22	72	Exceedingly stout. The only private case in list; I did not see her again
—	—	—	14	—	—	—	−12 −10	0	22	14	32	6	32	Well developed
17¼	22	23¼	12 14	—	—	18 22	−2 0	8	24	15	—	10	32	
14	18⅞	20¼	0	—	4 after lying on back	10	−9	−2	14	−2	30	4	23	Girth of waist 2 in. above umbilicus, 27 to 27¼ in.
13¾	18⅝	19¾	10	—	—	16	−3	8	18	4	24	8	32	
—	—	—	22 28	—	—	—	10 6	16	32 36	22	—	12	32	Not well developed
15⅝	21⅛	22	35 41 30	—	30 after lying on back	36 34	0 −2	14	36 40	24	50	10	40	On deep breath great descent of diaphragm. Rectum empty
—	—	—	11 12	—	—	—	−6 −8	6	29 30	20 24	52 62	8 10	52 62	
15	21¼	22¼	30 28 12	—	—	36 32	+1	8 6	40 38	—	—	6	66 76	
17	22⅞	24½	32	—	—	36 26	4	16 12	42 34	—	—	12	18	Is very strong
19¾	25⅛	27	17	—	—	25 27	+1 −3	13 17 19	33	27	—	19	50	Sitting up in bed —45
19¼	25	25¾	—	—	—	—	—	—	—	—	—	—	—	

Case	Patient	Age		Date of observation	Period of pregnancy	Fundal height	Pelvic measurements				Separation of recti	Girth of body at			
							Interspinous	Intercristal	Intertrochanteric	External conjugate		Umbilicus		Thoracic base	
												Rest	Deep breath	Rest	Deep breath
						in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
9	P. F.	—	Confined Feb. 24	Mar. 15, 1909	—	—	—	—	—	—	¾	30¾	31¾	29¼	31½
10	E. W.	21	Primi-gravida	Feb. 1, 1909	—	—	9	10½	12½	7¾	½ to ¾	32¼	—	31	—
	,,	—	Confined Mar. 23	April 7, 1909	—	—	—	—	—	—	Very slight	29⅝	29¼ (i.e. less)	28[illegible]	30
11	A. F.	18	Primi-gravida	Feb. 15, 1909	Last regular period Dec. 25, 1908	—	—	—	—	—	None	27½	27¼	30¼	31¼
12	B. R.	21	Primi-gravida	Feb. 22, 1909	Last regular period June 17, 1908	—	9	9¾	11	6½	2¼	31¼	32½	27¼	28½
	,,	—	Confined Mar. 12	Mar. 29, 1909	—	—	—	—	—	—	½	27¼	27½	26½	27¾
13	L. B.	26	—	Mar. 9, 1909	Last regular period July 15, 1908	—	10	11	11	7¾	1¾	33	34	28½	29¼
14	E. C.	18	Primi-gravida	Mar. 9, 1909	Last regular period September, 1908	—	10	11	12	7⅝	½	34	35	32½	33¼
	,,	—	—	April 13, 1909	—	11½	—	—	—	—	¾	33⅞	34¾	32¼	33
	,,		Confined May 20	June 17, 1909	—	—	—	—	—	—	Scarcely any	28	28½ 28¼	31½	32¼
15	A. W.	22	Primi-gravida	Mar. 15, 1909	Last regular period August 12, 1908	11½	8½	10¼	11½	8	2	34½	34¾	31¾	32½
	,,	—	—	April 13, 1909	—	—	—	—	—	—	2	36½	36½	32¼	32¾
	,,	—	Confined May 7	June 12, 1909	—	—	—	—	—	—	*Nil*	27⅞	27⅞	30¾	32

LENGTH OF PUBO-STERNAL LINE			PRESSURE IN RECTUM MEASURED IN MILLIMETRES OF MERCURY											Remarks
	Pubes to													
Ensiform cartilage	Supra-sternal notch Rest	Supra-sternal notch Deep breath	Left side	Left side + coughing	Left side	Flat-back	Knee-chest	Left side	Standing erect	Standing + bending	Standing + lifting	Left side	Left side, straining	
in.	in.	in.												
14$\frac{1}{4}$	21	22$\frac{3}{8}$	10 11	—	—	15 18	−8	6	18	12	36	5 6	32	Lying on back. Massage of upper abdomen = 26 mm., of hypogastrium 30 mm.
15$\frac{1}{8}$	21$\frac{1}{4}$	22$\frac{1}{4}$	12	—	—	26	−4 0	4 6 10	28 26 28	10	—	6	40	Sitting, 34-38, i.e., even greater than when standing
14$\frac{1}{4}$	20$\frac{1}{8}$	21	14	—	—	20	−4	8	28	16	—	10	30	
14$\frac{1}{2}$	20$\frac{1}{4}$	21$\frac{1}{2}$	13 10	—	—	15	−2 +4	8	28	8	80	9	80	Body of uterus not felt since she contracts her muscles
17$\frac{1}{2}$	22$\frac{1}{4}$	23	22 20 16	—	—	—	0 +18	12	30	20	30	14	48	
14$\frac{1}{4}$	19	20	10	—	—	—	−6	7 12	20	14	24	14	40	
16$\frac{1}{2}$	21	22^{3}	14	—	—	28	16	—	32 34	22	—	14	40	
15$\frac{3}{4}$	22	23^{1}	16	—	—	28 D. B. 34	0	16 18 Rise on insp., fall on expir.	30	18 20	64	12	28	Height 5 ft. 6 in.
16$\frac{1}{4}$	22	23^{3}	16 18	—	—	24 D. B. 22	−10 D. B. +18	10 12	28	14	16	10	34	D. B. = deep breath
14$\frac{1}{4}$	20	21	8	—	—	16	−8 −10	8	24	16	26	6	16	
15$\frac{1}{4}$	20$\frac{1}{4}$	21^{3}	26	—	—	32	−2 −3	14	30	22	36	4	74	Fœtal head in pelvis. Height 5 ft.
16$\frac{1}{2}$	22$\frac{1}{2}$	—	24	—	—	26	8 10	20*	10 38	36	40	20	44 80	*Slight rise on inspiration. Slight fall on expiration
13	17$\frac{1}{4}$	18$\frac{1}{2}$	10	—	—	18 20 Knees bent	−6† −2‡	10 D. B. 18 then to 8	24	16	34 →24	10	48 44	† At end of expiration. ‡ During inspiration. Sims's position, 14. Sitting on bed + knees bent, 28; sitting with feet on stool, 26; ditto D. B., 30

Case	Patient	Age		Date of observation	Period of pregnancy	Fundal height	PELVIC MEASUREMENTS				Separation of recti	GIRTH OF BODY AT			
												Umbilicus		Thoracic bas	
							Interspinous	Intercristal	Intertrochanteric	External conjugate		Rest	Deep breath	Rest	Deep breath
						in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
16	V. H.	16	Primigravida	April 7, 1909	7 months	11¼	9¼	10½	12	7¾	1	33½	34½	31	32
17	E. B.	32	Primigravida	April 7, 1909	Last regular period Sept. 25, 1908	10½	9½	11	12	8	⅜	33½	34¼	30¼	30
18	G. E.	22	Primigravida	Dec. 10, 1908	Term	9	9¼	10½	11¼	8	2¾	33	—	—	—
,,	—		Confined Dec. 12	Jan. 7, 1909	—	—	—	—	—	—	¾	26¾	—	—	—
,,	—		—	Jan. 28, 1909	—	—	—	—	—	—	Scarcely any	27½	—	—	—
19	K. K.	26	Primigravida	Mar. 9, 1909	—	—	—	—	—	—	2	36¾	37¼	31½	31¼
,,	—		,,	Mar. 15, 1909	—	—	—	—	—	—	2½	37½	38½	32¾	33¼
,,	—		—	Mar. 22, 1909	—	—	—	—	—	—	2½	38¾	39½	31½	31¾
												Having taken two pillows away			
												38	39		
,,	—		—	Mar. 29, 1909	—	—	—	—	—	—	2½	38¼	39¼	31¾	31¾ (gets less)
,,	—		Confined Mar. 31	April 8, 1909	—	—	—	—	—	—	Scarcely any	27¼	27¾	26¼	27¼
,,	—		—	May 5, 1909	—	—	—	—	—	—	,,	26¾	28	27¼	28¾

LENGTH OF PUBO-STERNAL LINE			PRESSURE IN RECTUM MEASURED IN MILLIMETRES OF MERCURY											Remarks
Pubes to														
Ensiform cartilage	Supra-sternal notch		Left side	Left side + coughing	Left side	Flat-back	Knee-chest	Left side	Standing erect	Standing + bending	Standing + lifting	Left side	Left side, straining	
	Rest	Deep breath												
in. 14⅞	in. 20¼	in. 21⅝	14	--	16	24 22	0 −2	16	35	14 Height 5 ft. ½ in.	40	—	30 32	When lying on back no marked prominence of abd. ant., the bulging having taken place laterally
14⅞	20¾	21⅝	16	—	—	22	—	17	32	—	—	—	20	Had a subperitoneal fibroid size of small cricket ball in Douglas's pouch, which I removed in May, 1909, *per vaginam*. Recovery. Patient delivered herself of a dead macerated child on June 8, 1909
—	—	—	20 26	92	—	—	6	18	38	26	Can scarcely lift	26 16	42	Toxæmia of pregnancy. Fœtal head in pelvic cavity right down on pelvic floor
—	—	—	4	—	—	—	−10 −8	2	16 18	6	32	2	22	Child weighed 5 lb.; 18 in. long. Did well
—	—	—	6 10 4	—	—	—	−8	0	24 26	—	—	2	—	Getting fatter. Cheeks much fuller. Patient was menstruating and shivery
15½	21	22⅛	36 30	84	—	44	14	26	52 46	30	--	22	44 54	Patient in bed since March 6. Syphilis and albuminuria. Height 5 ft. 4 in.
—	—	—	26	90	—	35	—	26 28	40 44	—	—	24 23	44	Appears to be a good deal of liquor amnii. Considerable descent of pelvic floor. Swelling of labia
16¼	22	23	28 26 After resting 22	—	—	38 40 D. B. 48	14 18	28 30 22 24	42 44	32 30	54	24	42	
16⅜	22½	23⅜	34	—	—	46	24 26	33 Semi-prone 37	54	46	58	33	52	Still some œdema of legs. Had ordinary diet for last two days' contrary to orders.
13½	19⅛	20¼	14	—	—	24	4	14	34 38	—	—	24	—	Bag used was of fairly thick rubber
14⅜	19¾	21¼	10	—	—	22	−4	10 8	24 30	12	—	12	50	Uterus, anterior, small. Rectum empty

Case	Patient	Age		Date of observation	Period of pregnancy	Fundal height	Pelvic measurements				Separation of recti	Girth of body at			
							Interspinous	Intercristal	Intertrochanteric	External conjugate		Umbilicus		Thoracic base	
												Rest	Deep breath	Rest	Deep breath
						in.	in.	in.	in.	in.	in.	in.	in.	in.	in.
20	F. T.	27	II-gravida	Oct. 29, 1908	6 months	9	10½	11¼	12½	7¾	*Nil*	32½	—	—	—
	,,	—	—	Dec. 31, 1908	—	—	—	—	—	—	¾	34¼	—	—	—
	,,	—	—	Jan. 28, 1909	—	—	—	—	—	—	1¼	35¼	35⅜	30½	30
	,,	—	Confined Feb. 3	Feb. 22, 1909	—	—	—	—	—	—	None	28¼	29⅜	28	28
21	L. P.	24	II-gravida	Oct. 15, 1908	—	10½	9½	11¼	12¼	7½	1¼	33½	—	—	—
	,,	—	—	Oct. 29, 1908	—	10½	—	—	—	—	2	34½	—	—	—
	,,	—	—	Dec. 10, 1908	—	12	—	—	—	—	2¼	34½	—	—	—
	,,	—	—	Dec. 31, 1908	—	—	—	—	—	—	2½	35¾	—	—	—
	,,	—	Confined Jan. 15	—	—	—	—	—	—	—	—	—	—	—	—
22	L. J.	28	II-gravida	Nov. 10, 1908	5 months	—	10¾	11¾	13¼	8¾	Scarcely any	31¾	—	—	—
23	N. W.	18	II-gravida	Jan. 22, 1909	8 months	11¾	9¼	10¾	12½	7½	1¼	34	—	—	—
	,,	—	Confined Feb. 22	Mar. 9, 1909	—	—	—	—	—	—	*Nil*	28¾	30¼	28	29
	,,	—	—	Mar. 29, 1909	—	—	—	—	—	—	—	28½	30	28	29
24	R. L.	30	II-gravida	June 14, 1909	Last regular period end of Sept., 1908	Hand's breadth from ens. cart. 13	8¼	9¾	11¾	7¼	3	34	35⅛	30½	30⅞
—	A. B.	17	Nulli-gravida	Oct. 29, 1908	—	—	—	—	—	—	*Nil*	28½	—	—	—
—	L. S.	15	,,	Jan. 25, 1909	—	—	—	—	—	—	*Nil*	26	—	—	—

LENGTH OF PUBO-STERNAL LINE			PRESSURE IN RECTUM MEASURED IN MILLIMETRES OF MERCURY											Remarks
Pubes to														
Ensiform cartilage	Supra-sternal notch		Left side	Left side + coughing	Left side	Flat-back	Knee-chest	Left side	Standing erect	Standing + bending	Standing + lifting	Left side	Left side, straining	
	Rest	Deep breath												
in.	in.	in.												
—	—	—	18 22	62	—	—	−4	8 10	32 40	18	62	10	12 22 52	
—	—	—	18 22	—	—	—	−10 −4	10	32	18	52	10 12	42 62	Considerable bulging of both sides of abdomen
$15\frac{7}{8}$	$21\frac{3}{8}$	$22\frac{1}{4}$	20 22	—	—	30 32	4 6	20 21	40 44 38 42	32 34	72	18 21	62	
—	—	—	16	80	—	—	0	12 14	26 28	18	44	12	60	
—	—	—	—	—	—	—	—	—	—	—	—	—	—	First child three years ago. Descent of whole pelvic floor and part of posterior vaginal wall. Perineum intact
—	—	—	4 8	112	—	—	−6 −2	—	28 34	16	48	—	100	
—	—	—	8 10	—	—	—	−8	12	24 28	18	52	12	40	
—	—	—	12 16	—	—	—	−4 −2	8 12	32 38	18	62	10 16	32	
—	—	—	—	—	—	—	—	—	—	—	—	—	—	
—	—	—	28 30	132	—	—	0 4	14 16	28 32	20	—	—	52	Left next day on own accord. Denied previous pregnancy
—	—	—	4	—	—	—	−2 −4	9 10	23 21	14	36 42	8 10	34 38	First child born March 9, 1907. On raising head and shoulders considerable bulging of that part of abdominal wall outside recti and below umbilicus
—	—	—	24	—	—	22	+6	14	28	26 22	38	14	26	
—	—	—	10 8	—	—	19	−2	8	21	Rises to 30, sinks slowly to 22	32	10	36	Rectum contained some fæces
$17\frac{1}{2}$	$23\frac{1}{8}$	$24\frac{1}{8}$	20	—	—	—	6 4	18	32	20	52	12	12	Fœtal head in lower part of abdomen, freely movable above brim; can be pressed into pelvic cavity. Small amount of fæces in rectum
—	—	—	8	—	—	—	−8 −6	2 4	24 26	8 10	46	—	72	Big, strong, well developed girl
—	—	—	6	—	—	—	−8	6	14 22	4 6	52 72	4	52	

pregnancy—such hypertrophy will continue; just as it does in cases of corpulency. But when an adequate relaxation ceases to occur, spasticity begins; and this presumably goes on some time before the recti begin to separate and the muscle-fibres to stretch—for neither yields at once. Therefore it is not unreasonable to expect high pressure values in the mid-period of pregnancy. And the last point is this: Just as the tone of a muscle when hypertrophied is greater than when not hypertrophied, so much the easier or more readily will that muscle when hypertrophied be affected by the causes which lead to its spasticity. In well-developed women, therefore, a greater degree of spasticity is to be expected than in those who are not well developed. And it is just in the well-developed women in whom as a rule the pressures in the rectum are found to be most raised, and in whom the toxæmia of pregnancy is so liable to occur.

Thus measurements of the pressure in the stomach in the late, or in the last month of pregnancy, are not likely to indicate the true state of affairs that has been happening during the preceding months of that pregnancy. To obtain a true picture, many observations should be made throughout pregnancy on a series of individuals, best on primi-gravidæ. To carry out such a research would be almost practicably impossible. The only kind of place in which it could be done is such an institution as I have mentioned; but to attempt it, I fear, would cause a mutiny. Still, even single observations are of value, if done with care, and if accompanied with the necessary details of the physical condition of the patient. Especially would such be of value in cases in which excessive pressures are suspected. No doubt those obstetricians in charge of much clinical material may find opportunities for undertaking or assisting in a research so important and so full of promise for a real advance in obstetric medicine.

REFERENCES.

[1] Braune. (*a*) "Messungen über die Kraft der peristaltischen Bewegungen des Dickdarms und der Bauchpresse," *Centralbl. f. d. med. Wissensch.*, Berl., 1865, p. 913; (*b*) "Die Oberschenkelvene des Menschen in anatomischer und klinischer Beziehung," Leipz., 1871.

[2] Dally, Halls. "The Diaphragm in Man," *St. Bart.'s Hosp. Reports*, 1908, xliv, p. 190.

[3] Dickinson. "Studies of the Pelvis," *Amer. Journ. of Obstet.*, New York, 1889, xxi, p. 907.

[4] Duncan, Matthews. "Researches in Obstetrics," 1869, p. 410.

[5] Eccles. "Hernia," 1900, p. 191.

[6] Hasse. "Ueber die Bewegungen des Zwerchfells und über den Einfluss derselben auf die Unterleibsorgane," *Arch. f. Anat. u. Phys.*, 1886; Anat. Abt., p. 185.

[7] HERTZ. "Sensibility of the Alimentary Canal in Health and Disease," Goulstonian Lectures, *Lancet*, 1911, i, p. 1055.

[8] HÖRMANN. "Die Intra-abdominellen Druckverhältnisse," *Arch. f. Gyn.*, Leipz., 1905, lxxvii, p. 527.

[9] KEITH. "Enteroptosis," Allbutt and Rolleston's "System of Medicine," 1907, iii, p. 860.

[10] KELLING. "Physikalische Untersuchungen über die Druckverhältnisse in der Bauchhöhle sowie über die Verlagerung und die Vitalkapacität des Magens," Volkmann's Sammlung Klinischer Vorträge, *Innere Med.*, 1895, No. 44, p. 487.

[11] *Idem.* "Untersuchung über die Spannungszustände der Bauchwand, der Magen und der Darmwand," *Zeitschr. f. Biol.*, München u. Berl., 1903, N.F., xxvi, p. 161.

[12] MORITZ. "Studien über die motorische Thätigkeit des Magen," *Zeitschr. f. Biol.*, 1895, N.F., xiv, p. 328.

[13] *Idem. Ibid.*, p. 325.

[14] OLSHAUSEN. "Beitrag zur Lehre vom Mechanismus der Geburt," Stuttgart, 1901, p. 6.

[15] PARAMORE. "What is the Pelvic Floor?" *Journ. of Obstet. and Gyn. Brit. Emp.*, 1909, xv, pp. 193, 194.

[16] *Idem.* "The Evolution of the Pelvic Floor in the Non-mammalian Vertebrates and Pronograde Mammals," Hunterian Lectures, *Lancet*, 1910, i, pp. 1393, 1459.

[17] *Idem.* "The Pelvic Floor Aperture," *Journ. of Obstet. and Gyn. Brit. Emp.*, August, 1910.

[18] *Idem.* "The Intra-abdomino-pelvic Pressure in Man," Hunterian Lecture, *Lancet*, 1911, ii, p. 1677.

[19] SCHATZ. "Die Factoren, welche die Grösse des intra-abdominaler Druckes bedingen," *Arch. f. Gyn.*, 1872, iv, Satz. 46, p. 437.

[20] *Idem.* "Beiträge zur physiologischen Geburtskunde," *ibid.*, p. 74.

[21] STENGEL and STANTON. "The Heart and Circulation in Pregnancy and the Puerperium," *Univ. of Pennsylv. Med. Bull.*, September, 1904, xvii.

[22] WEISKER. "Bemerkungen über den sogen. intra-abdominellen Druck," *Schmidt's Jahrbücher*, 1888, p. 277.

[23] WYNTER. "Absence of Abdominal Respiratory Movement as an Indication of Pericarditis," *Proceedings*, 1911, iv (Med. Sect.), p. 40.

DISCUSSION.

Dr. GRIFFITH said that Dr. Paramore's elaborate paper deserved careful study, and that they all would recognize the amount of enthusiastic work which it represented. He was satisfied that Dr. Paramore had proved one object of his paper—namely, that intra-abdominal pressure was increased in pregnancy in primæ-gravidæ, and it was reasonable to infer that this was so in the multigravidæ whose abdominal walls remained firm. He had offered no evidence as to the pressure in the case of women with very lax abdominal walls, and it was highly improbable that there was any similar distension pressure. In these any increase in pressure would be mainly, if not entirely, weight pressure, due to the increased weight of the uterus and its contents pressing on any organ on which it rests, according to the varying positions of the woman, but not materially affecting the general intra-abdominal pressure. Dr. Griffith was doubtful if Dr. Paramore had sufficiently considered the gross variations in distension pressure due to the constantly changing physiological conditions, produced by distension of the bladder and of the gastro-intestinal tract as the result of taking food and of flatulent accumulation. Dr. Paramore appeared to look upon the ascent of the expanding uterus as something quite wonderful. What was there so wonderful in this, and in what way did it differ from the ascent of the bladder due to its distension? In both cases the expansion took place in a regular manner, the fundus of the pregnant uterus rising at the average rate of 1½ in. per month, but the base of the uterus remained at the same level throughout the greater part of pregnancy. If the uterus rose from the pelvis as a balloon ascends from the ground it would indeed be wonderful. Dr. Griffith asked Dr. Paramore what he meant by the sentence on p. 300 "the specific gravity of the pregnant uterus with contents . . . is approximately that of water." Dr. Griffith could assure him that the contents of the pregnant uterus reached as early as the third month to 1·030 and at full term to 1·050. Dr. Griffith hoped Dr. Paramore fully realized the nature of the difficulties before him in his attempts to prove that intra-abdominal pressure was the main cause of the toxæmia of pregnancy

The PRESIDENT said: Dr. Paramore's paper is important as it is intended to be a preliminary to a further paper which is to show that the toxæmias in pregnancy are due to an abnormal increase of intra-abdominal pressure. To-night he has confirmed the view already largely held that intra-abdominal pressure is increased in normal pregnancy, and has endeavoured to prove that it is due to increased tonic contraction of the abdominal (muscle) wall and of the thoracic diaphragm. He rests his proof of this largely on the increase of pressure which he and others find in the rectum of pregnant women, and he considers that this increase of pressure, with variations in different postures, is due to the same cause as the intra-abdominal pressure. Further, he considers that the amount of intra-rectal pressure is a reliable index of the intra-abdominal pressure. That is a line of argument I find it difficult to follow. The tone or "tonic contraction" of which he speaks is the contraction of the muscle *at rest*. If so, is the rectum a good index? Surely putting a rubber bag, a foreign body, into the rectum must increase the intra-rectal pressure, for it adds to the rectal contents, and is liable to induce peristalsis throughout the whole bowel. It thus would almost certainly increase the local tension quite apart from intra-abdominal pressure. The same objection holds good to pressure tests made in bladder and stomach. The further fact that muscles in the abdominal wall and diaphragm are found hypertrophied during pregnancy is only what one would anticipate. They are preparing for the expulsive efforts needed at parturition. This does not, however, prove that this muscular development is the cause of the increased intra-abdominal pressure. How is it that intra-abdominal pressure in pregnant women does not go on increasing till the end of pregnancy? How is it that pressure is not invariably more in primiparæ than multiparæ, for surely in the former the tone or tonic contraction would be greater? Has Dr. Paramore found out what the intra-rectal pressure is when the abdomen has been opened? Does it then represent atmospheric pressure? Why should not the elongation and stretching of the abdominal muscles associated with pregnancy, and the broadening of the thoracic diaphragm, be the result of the increased intra-abdominal pressure instead of its cause? Personally, I think much more proof will be needed before we adopt this first step in Dr. Paramore's argument, for it is almost certain that although pregnancy toxæmia may be associated with increased intra-abdominal pressure, both the toxæmia and the increased pressure are due to bio-chemical causes.

Mr. GLENDINING agreed with the remarks of the President as to the little value of intra-visceral pressure as an index of intra-abdominal pressure. The only reliable method of obtaining information concerning this pressure was by some form of manometer introduced into the peritoneal cavity. The separation of the rectus muscles was erroneously ascribed to stretching of the transversalis muscles. It was in reality due to stretching of the fascia which united the transversalis muscles in front, and which herniated between the recti and caused them to be separated. Further, a stretching of the transversalis muscles attributed to a continuous strain of increased intra-abdominal pressure was untenable when it was realized that these muscles were well supported during the night for the side on which the patient rested, and during the greater part of the day on both sides.

Dr. EDEN said he thought great credit was due to the author for the evident enthusiasm with which he had worked, and for his courage in reviving a mechanical theory of a pathological condition at a time when the tendency was to attribute nearly everything to bio-chemical causes. He thought they would all be deeply interested in the paper which the author told them was in preparation, and which was to prove that the toxæmias of pregnancy were due to increased intra-abdominal pressure. With regard to the present paper he was disposed to think that it contained too much theory and too little fact. The absence of control observations on non-pregnant women and on other forms of abdominal distension such as ovarian and fibroid tumours, greatly weakened the force of the author's arguments. He thought also that some of the author's conclusions, although not in themselves unreasonable, were inadequately supported by his facts. For example it was stated that the abdominal muscles of corpulent women were unusually powerful, and the conclusion deduced that the muscles had become hypertrophied as the result of increase in the visceral mass due to deposits of fat in the omentum, mesentery, renal region, &c. But it was quite possible that these persons were muscular before they became corpulent, not corpulent before they became muscular. If the author was right in thinking that the transversales muscles during pregnancy underwent spastic changes consisting partly of hypertrophy and partly of degeneration, why did he not seek histological proof of this conclusion? Definite microscopical changes could be found in muscles which were the seat of spastic degeneration. When Dr. Paramore came to apply his present results to the question of the causation of toxæmia Dr. Eden hoped that the evidence he brought forward would be more convincing, for it would be a difficult task to upset the careful and scientific work of the last few years, which carried to the minds of most men the conviction that this condition was due to bio-chemical, not to mechanical changes.

Dr. R. H. PARAMORE, in reply, said he wished to thank the Fellows of the Society for receiving his paper and for the criticisms bestowed on it. Dr. Griffith had drawn attention to the statement made in the paper that the specific gravity of the pregnant uterus was approximately that of water, and pointed out the specific gravity of the fœtus and liquor amnii was greater than water. Dr. Paramore admitted this at once. The statement referred to was used or implied by those investigators who had measured the pressure in the rectum and had formed opinions from their results. They had assumed the specific gravity of the collective viscera with their contents to be approximately equal to that of water, and since the column of water supported by the rectal pressure was always more or less equal to the height of the visceral column, they argued the pressure in the rectum is due alone to the visceral weight and not at all to the compression of the abdominal viscera by the abdominal wall and diaphragm. Dr. Paramore had shown that even accepting such premises the conclusion was invalid. He thanked Dr. Griffith for pointing out the misuse of the suffix "para." It ought to have been "gravida"; and this change had been made in the paper. Criticism had been raised as to the method of measuring the intra-abdominal pressure. Mr. Glendining had said the only way to measure the pressure was by introducing a bag into the peritoneum; and the President thought that introducing a bag into the rectum would cause peristalsis. It was, however, impossible to obtain any idea of the pressure and its variations within the abdomen by introducing a bag into the peritoneal sac. For that, the patient would have to be anæsthetized and the muscles of the abdomen would be paralysed. If the pressure within the abdomen during pregnancy had any relation to disease, such as heart disease, it was necessary to have some idea of the pressure during consciousness and during states of activity. Such could only be obtained by measuring the pressure in one or other of the accessible viscera. If a small bag, such as an ordinary fingerstall, was put into the rectum it might cause some slight change in the pressure conditions; but such was negligible, it certainly did not mask the true state of affairs. When, for instance, the patient got into the knee-chest position, the manometer showed the pressure was negative; in which case it was clear the rectal musculature was not contracted. And in other positions variations, due to respiration, occurred in the rectal pressure. So also measurements of the pressure in the stomach showed oscillations due to the heart-beat. These changes could not occur if the muscular walls of the rectum and stomach respectively were contracted. It showed they were uncontracted. He (Dr. Paramore) thanked Mr. Glendining for the interest he had shown in the paper. He would, however, remind him that the median aponeurosis was a part of the flank muscles. How did Mr. Glendining explain the stretching of the aponeurosis if the transversales muscles played no part in it? This aponeurosis did not stretch in the transition from the slim to the corpulent state; nor as a result of the growth of ovarian cysts or of fibroid tumours. Clearly the stretching in pregnancy was the result of the inadequate relaxation of the muscle fibres of the transversales, which was prevented from occurring during resting conditions by the continued and rapid rate of growth of the uterine contents. This progressive expansion caused an increased tonic contraction of the muscle-fibres, of such an order and so persistent that both the muscular and aponeurotic parts of the transversales suffered. The degeneration or the atrophy which ensued showed itself as a weakness during activity; but the increased tonic contraction of the muscle-fibres with which the atrophic change was associated caused an increased compression of the viscera to be maintained even during resting conditions—i.e., during sleep at night. It was clear—to answer a criticism of the President—that the stretching, the yielding, was the result of the intra-abdominal pressure—the stretching tended to allow the pressure to fall; but the resistance to the stretching was the cause of the pressure—it tended to maintain the pressure high. The question has been raised: Supposing the pressure was increased, what then? The answer to this was plain. The abdomino-pelvic cavity was a closed space filled with incompressible but deformable viscera. These viscera were compressed continuously by the abdominal wall and diaphragm, and this compression caused a squeezing out of the blood from the abdominal viscera into the thorax. That was how the compression worked; that was what the transversales and diaphragm were for. It had been thought that this effect was produced by compressing the veins in the abdomen alone; but the compression had another effect, it compressed the blood within the capillaries and affected the blood-flow through the visceral capillaries. If the intra-abdominal pressure became raised and was maintained persistently raised, it was not difficult to see that the blood-flow through visceral capillaries would be affected. Dr. Eden had thought the proof that the pressure within the abdomen in pregnancy was maintained raised was unsatisfactory. He had said there was too little fact and too much theory. But the point was: Was the theory sound? For facts alone could prove little or nothing. How long had the fact of pulsation of arteries been observed before the significance of that pulsation was discovered? The facts presented in the paper were: The increase in intra-rectal pressure, not only in the erect and supine positions, but also in the lateral at ease; the hypertrophy of the pelvic floor musculature; the increase in length of the muscle-fibres of the transversales and the separation of the recti; the increase in length of the fibres of the diaphragm—all occurring in pregnancy; and the important *fact* that increase in length of (striated) muscle, caused by stretching, induces an increase in tonic contraction of that muscle. This was an astounding, yet easily ascertainable, fact; but speakers had passed it by. In light of it, Mr. Glendining's criticism as to the state of the transversales in pregnancy was void of meaning; to Dr. Paramore the criticism was unintelligible. Were not these facts sufficient for Dr. Eden? The author had referred to the pressure in the stomach in pregnancy. Owing to lack of clinical material, he had been unable to make observations as to that fact; but Dr. Eden and other obstetricians had plenty of such material. It would interest the author to see what use they made of that material. Dr. Paramore had referred to the condition of the transversales in corpulency to elucidate the condition of those muscles in pregnancy and to explain the separation of the recti. Dr. Eden had thought the hypertrophied state of these muscles in corpulency might be explained by the individual being well developed muscularly before becoming corpulent, and that no hypertrophy need necessarily occur by becoming corpulent. He had said the only way to prove the pelvic floor hypertrophied in the transition from the slim to the corpulent state was by palpating the pelvic floor in a patient who was thin, and then again palpating it in the same patient when she had become fat—i.e., after an interval of two or three years. That, to Dr. Paramore, was an absurd criticism. It was impossible of application. In the case of the transversales it was clear their muscle fibres had become longer in corpulency; the muscles either must have relaxed, in which case they would have become thinner and weaker, or they must have hypertrophied. And Dr. Eden appeared to admit they were hypertrophied in corpulency. One had also the fact that palpation showed the excellent condition of the transversales in corpulency. How, then, could Dr. Eden maintain his position that these muscles might have been as well developed in the individual when in the non-corpulent state? That Dr. Eden's objection was untenable was shown by the *fact* that the intra-rectal pressure was increased in corpulency—was greater than in individuals with flat abdomen, even in those who were well developed muscularly, and who, physically, were quite strong.

In answer to Dr. Eden's question—Why had he (the author) not examined the transversales muscles in pregnancy microscopically?—he would frankly say it had not occurred to him to do so. Such examination might yield important information. At the same time he thought the evidence in the paper (facts and reasons) sufficient to allow one to conclude that the transversales muscles did degenerate or atrophy as a result of pregnancy. Surely Dr. Eden did not doubt they did so? It would be strange to find anyone who entertained such a doubt. This degeneration could only be associated with a state of spasm, a condition brought on by over-work—rather by over-stimulation—caused by the muscles being stretched persistently for a prolonged period, with a resulting increase in intra-abdominal pressure.

The author was not afraid of advancing to the further question: The relation of the increased intra-abdominal pressure in pregnancy to the toxæmias of pregnancy. He believed the majority of obstetricians accepted the biochemical hypothesis for want of a better. It had not been proved; it was built on suggestion, and it was, to say the least, an unreasonable hypothesis. The mechanical theory had been abandoned because, although obstetricians had half-heartedly believed the intra-abdominal pressure was increased in pregnancy, others had denied the pressure was increased, and it had never been proved that an increase occurred. The author felt he had proved that such an increase did occur. The proof rested on the fundamental *fact* that muscle increases in tone when it is stretched. On this rock, which speakers had not struck, a theory capable of standing might be raised.

Obstetrical and Gynæcological Section.

July 3, 1913.

Dr. AMAND ROUTH, President of the Section, in the Chair.

Calcified Ovarian Fibroma obstructing Labour.

By H. S. SOUTTAR, M.Ch.

AT 10 p.m. on April 20, 1912, I was asked by Dr. Mansel, of Brentwood, to see Mrs. W. She had been in labour for four days in charge of a midwife, and Dr. Mansel had just been called in to see the case. It appeared that the head could be felt near to the perineum but that there was no sign of the os uteri. On examination I found the child lying with the back anterior and the head high above the pelvic brim. On vaginal examination the pelvis was almost filled by what at first appeared to be another head, a rounded mass in which could be felt plaques of bone arranged over a soft substance. This tumour could be felt through the posterior fornix, whilst the os uteri could just be made out with considerable difficulty high up behind the pubes. The tumour was immovable, but whether this was due to its attachments or to the contraction of the uterus it was impossible to say. The uterus was in a state of almost continuous contraction, and it was obvious that immediate action must be taken if the patient's life was to be saved. The first point to be decided was whether we had to deal with a pelvic tumour outside the uterus or with an impacted twin. The mass was of such an extraordinary nature that the second alternative could by no means be disregarded. A small incision was made in the posterior fornix and a finger introduced through this opening. It at once became obvious that I was outside the uterus and that a large calcareous tumour entirely blocked the pelvic outlet.

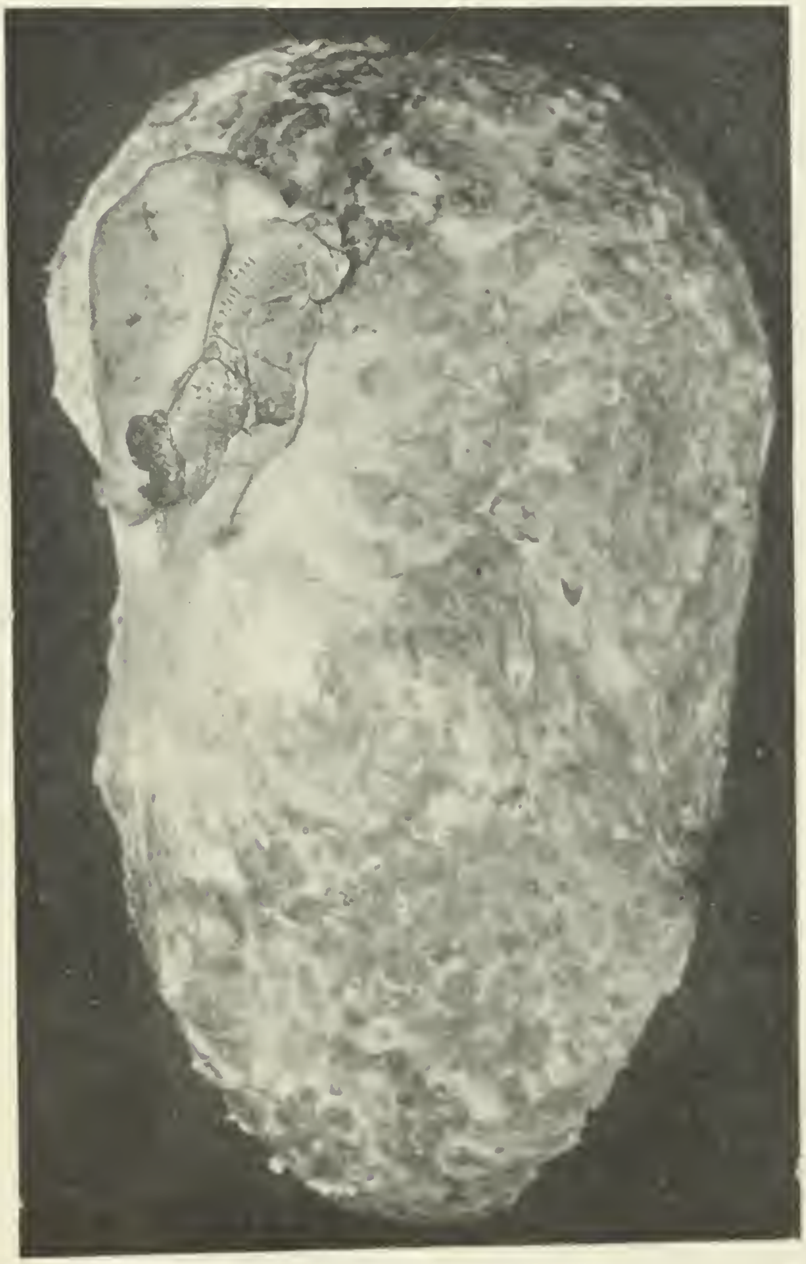
The patient was at once transferred to Brentwood Cottage Hospital for Cæsarean section. This was performed at 1 a.m. The placenta was anterior. A well-developed living child weighing 7½ lb. was delivered, the placenta removed, and the uterus closed with stout silk. The upper surface of the tumour was seen as a calcareous mass filling up the pelvis, but the patient's condition was so urgent that further investigation was impossible. She made, however, a good recovery and left the hospital on May 22 in good health. There was still considerable discharge from the vagina and there was extensive ulceration of the posterior vaginal wall in the region of the exploratory incision.

I saw the patient at intervals and had several X-ray photographs taken at the London Hospital by Dr. Scott. The ulceration and discharge persisted, but the tumour became to some degree movable. Vaginal examination gave an extraordinary sensation, the finger appearing to enter a mass of broken glass, the sharp spicules of which readily cut rubber gloves.

On September 22, 1912, I operated at Brentwood Cottage Hospital for removal of the tumour. I was anxious that such an exceptional case should be seen by a gynæcological expert, and Dr. Drummond Maxwell very kindly came down to assist me. The abdomen was opened under stovaine spinal anæsthesia. The uterus was adherent to the back of the old incision and had to be detached from the left side of the wound. The uterus was now of normal size and appearance. On drawing it forward the upper surface of a large calcareous tumour was seen filling the pelvis. The tumour was adherent to all the surrounding structures, but was shelled out without difficulty. It proved to be attached to the right ovary by a narrow pedicle. It was considered safer to remove the right ovary with the tumour. The abdomen was closed as usual. The patient made an uninterrupted recovery and left the hospital on October 19. When seen in December both she and her baby were in perfect health.

PATHOLOGICAL REPORTS BY G. B. BARTLETT.

Macroscopic.—An oblong tumour partially covered by peritoneum. Tumour measures 18 cm. by 9·5 cm. by 9·5 cm. On one convexity of the oblong is attached a normal ovary and a portion of tube with mesosalpinx. The peritoneal surface is covered by small calcareous plates. There is a large ragged surface at one pole which measures about 10 by 7 cm. Its surface shows irregular calcareous nodules, and part of it is dirty brown and sloughing. Some of the nodules are apparently separated. The tumour was sectionized by a band-saw and cut with considerable difficulty. The cut surface is homogeneous. It has a ground-work of white œdematous-looking fibrous tissue in which are embedded innumerable calcareous nodules; these as a rule have a somewhat yellow colour. They vary in size, but are mostly about that of a pin's head. Their cut surface has not a bony appearance. The centre of the tumour shows most fibrous tissue. Weight of specimen, 4 lb. 8 oz.



Calcified ovarian fibroma obstructing labour.

Microscopic.—The section shows interlacing bundles and masses of thick, tortuous collagen fibres and sparsely scattered spindle cells between the fibres. The cells have an indefinite outline and their nuclei are small spindle or oval. Blood-vessels with well-developed walls are fairly numerous. There are some large masses of calcareous material in the fibrous stroma. In parts the fibrous tissue is rarefied and shows some œdema.

Ovarian tumours complicating pregnancy are not very uncommon, occurring once in every 1,500 cases (Munro Kerr). They only rarely obstruct labour in such a way as to demand Cæsarean section, and they are responsible for only 28 of the 1,282 cases of that operation collected by Dr. Amand Routh. Of these only one resembled the present case. The operation was performed by Dr. Herbert Spencer in 1903, both mother and child surviving. In that case the condition was diagnosed some time before full term. The tumour was shown before this Section in 1909 and weighed 1 lb. 8 oz. So far as I can discover this is the only case in the literature, and the case I have brought before you is the only case of emergency Cæsarean section for this condition which has yet been described.

DISCUSSION.

Dr. HERBERT SPENCER alluded to the sharp spicules on the surface of the tumours; they were also present in the case the speaker had published,[1] and in another (Coudert's) the replacement of one of these spiny fibroids had caused laceration of the large vessels in the broad ligament. It appeared advisable, therefore, in such cases to perform Cæsarean section, which, in the speaker's opinion, was not justifiable in the case of ordinary cysts incarcerated in the pelvis.

Dr. HUBERT ROBERTS had seen a similar case recently in consultation with Dr. MacKay and Dr. Stack in the North of London, where a tumour in Douglas's pouch obstructed delivery. Attempts had been made with forceps to deliver the child, without success. Dr. Roberts sent the case into Queen Charlotte Hospital and delivery by Cæsarean section was necessary, as after eventrating the uterus the tumour was found to be intraligamentous. During the enucleation of the tumour the lower uterine segment was so extensively wounded that it was deemed wise to remove the whole uterus, in fact, Dr. Roberts could not see that any other alternative was possible. Both the mother and child survived. Dr. Roberts agreed with Dr. Herbert Spencer that if the tumour could have been removed after eventrating the uterus the Cæsarean section and subsequent removal of the uterus might not have been necessary.

---

[1] *Proceedings*, 1909, ii, p. 231.

Suggestions for the Technique and Performance by a New Method of Wertheim's Abdominal Panhysterectomy.

By Charles P. Childe, F.R.C.S.

Two dangers are conspicuous in the performance of Wertheim's abdominal panhysterectomy for cancer—shock and sepsis; shock because the operation under the most favourable conditions is a severe and prolonged one; sepsis, because in addition to circumstances conducive to infection being present, a septic stage is introduced of necessity into the operation itself. It will be understood that I am omitting the normal risk of infection which attends the performance of every operation and which can be practically eliminated by a careful operative technique.

The following are the special circumstances favourable to infection in Wertheim's operation:—

(1) Patients suffering from the disease for which the operation is performed are usually below the average standard of health, their resistance power against infection is diminished, and they respond therefore readily to it.

(2) In addition to the peritoneal cavity two extensive wounds are exposed to infection during the operation—one in the abdominal wall, the other in the pelvis. The former, moreover, is one whose surfaces have been a good deal pulled upon and contused in the retraction necessary for the performance of the operation, and wound surfaces injured in this manner offer a poor resistance to infection.

(3) The pelvic wound is open to the external surface by way of the vaginal canal.

(4) Retzius's space is freely opened, and this dead space offers a favourable nidus for the accumulation of wound discharges and their subsequent infection.

Furthermore, the patient may be actually infected at the time of operation from a foul ulcerating growth, though in operable cases there is, as a rule, no evidence of this as judged by the pulse and temperature.

When it is considered that in the presence of the above-mentioned favourable conditions for infection we of necessity introduce a septic stage as part of the operation, it is not surprising that infection should readily occur. Most of the conditions favouring infection are inherent in the operation itself and cannot be avoided. An important exception in this connexion, and one which Wertheim has insisted upon is the method of retraction of the abdominal wound—gloved fingers alone should be employed in this manœuvre, as they are the least harmful retractors, and bruise the wound surfaces much less than heavy metal ones. The matter over which we possess chief control in lessening the risk of infection is the diseased and septic uterine cavity and the pelvic wound left after the removal of the uterus, and according to the manner in which these are managed will depend, mainly, the results obtained. In the management of the septic uterine cavity the following is my own practice. To begin with, I do not think that preliminary treatment is efficacious. Various preliminary measures, such as antiseptic vaginal douching, &c., may be adopted according to the fancy of the operator, but disinfection to be efficacious must be done as part of the operation itself and after the patient has been anæsthetized. Formerly, after thoroughly curetting away the soft growth a few days before operation and applying carbolic acid or iodized phenol to the surface, I used to employ in the interval copious antiseptic vaginal douching, followed by a thorough cleansing of the vagina by the house surgeon with the patient in the lithótomy position, just before she was brought to the theatre. This was in order to lessen the time the patient was under the anæsthetic. I was never, however, satisfied with the results obtained even under the most careful regime. Frequently a little discharge was seen on dividing the vagina; frequently infection of the abdominal or pelvic wound occurred. I have, consequently, for some time past abandoned this method in favour of the following, notwithstanding the extra ten minutes or quarter of an hour it adds to the operation, and it has yielded far more satisfactory results; in fact, infection has almost disappeared, though formerly it was as high as 30 per cent. The patient, anæsthetized for the operation and just previous to it, is placed in the lithotomy position. All the soft growth is removed with scissors and sharp spoon. The raw surface left is very thoroughly cauterized with Paquelin's cautery. The vagina is then scrupulously dried and painted with 2 per cent. iodine in spirit.

Finally the raw surface and the vagina are closely packed with dry sterile gauze, one end of which is left hanging out of the vagina. When the vagina is about to be divided the gauze is withdrawn by an assistant not taking part in the operation. If the above procedure is efficiently carried out, the vagina on division is as it should be, perfectly dry. Wertheim himself dries the vagina out immediately before its division with sterile swabs on long-handled forceps. This not only necessitates the surgeon desisting from the operation for a few valuable minutes, but it is not so certain of securing an absolutely dry vagina, and is objectionable owing to the operator taking part in an unnecessary septic procedure during the performance of the operation. The area about the uterus is surrounded with two large gauze packs soaked in salt solution just previous to division of the vagina, and immediately after its division these are folded round so as to enclose the uterus while it is lifted out of the pelvis.

An equally important consideration is the technique to be adopted for the pelvic wound. The most important points here are:—

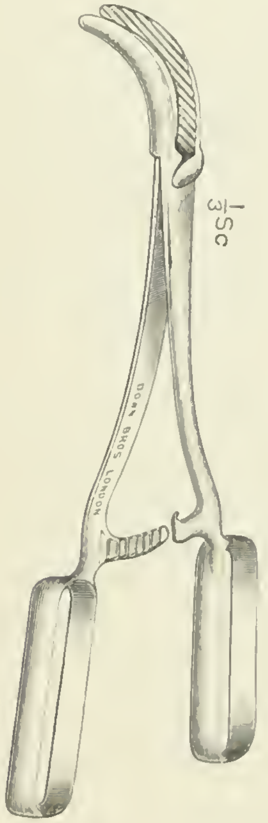
(1) Securing perfect hæmostasis if possible.

(2) Leaving no foreign bodies, such as ligatures, in the wound, of which I shall speak directly.

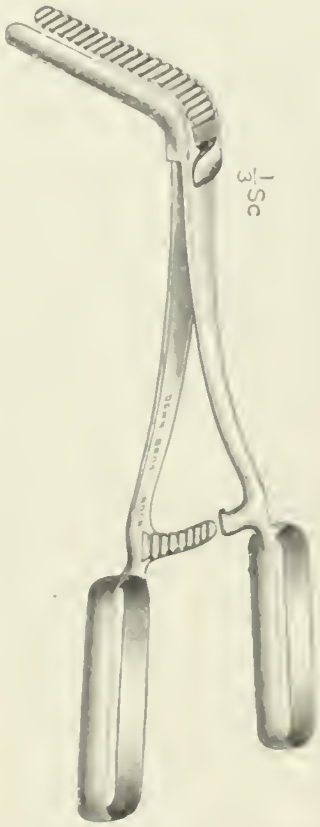
(3) Discarding of gauze for drainage purposes.

Where I have secured perfect hæmostasis—i.e., in nearly all cases—I employ no drainage whatever. The only cases in which gauze is employed are the quite exceptional ones in which venous oozing is impossible to arrest, at all events without much loss of time. Such cases have occurred to me. In these I have employed gauze for hæmostatic but not for drainage purposes, and it is removed in twenty-four hours. Formerly, following the practice recommended by Wertheim, and I believe still adopted by him and others, I used to leave gauze packing in the pelvic wound for five or six days. On withdrawal it was invariably exceedingly foul, and I cannot believe, notwithstanding Wertheim's high authority for it, that it is a sound practice to follow.

The second conspicuous danger in Wertheim's operation is shock or exhaustion. For this, again, there are favouring conditions—e.g., the low state of nutrition owing to loss of appetite, wearing pain, and frequent losses of blood and discharge from the ulcerating growth. These we have to take generally as we find them. We are not dealing with a disease in which we can afford to spend much time in building the patient up. At the same time, in inoperable cases patients will improve so strikingly for a short time from the simple operation of curetting away the soft growth, and so arresting the discharges, that in some operable cases, where the general condition is unfavourable owing to constant losses and in which it is doubtful whether the patient will stand the operation, this step should, I think, be resorted to as a preliminary measure, and the operation may with advantage be postponed for two or three weeks, when the patient will frequently be found to be in a much better condition to go through it. Usually, however, the operation is performed without any delay, and inasmuch as even in the easiest cases it is a severe and prolonged one, any steps are desirable which facilitate it and make for the saving of time, provided that they are surgically sound. Formerly finding a ureter, especially the left ureter in a fat subject, was sometimes a difficulty to me and a cause of delay, but if the ureters are not exposed at once on opening up the broad ligament, they can always be readily felt between the forefinger and thumb, and no time need therefore be wasted over this step. In my experience the most prolonged part of the operation is dealing with the parametrium and vagina—i.e., applying the ligatures to the sections of parametrium in a fat subject or one with a deep pelvis, or where the uterus is fixed and cannot be drawn up, and stitching round the vaginal wall after it has been divided. Now there is a quicker, and I believe a better, way of dealing with these steps of the operation, and latterly I have only employed four ligatures in the operation, one for each ovarian and one for each uterine artery (of silk). The round ligament contains no large vessel and is crushed and divided without ligature. The parametrium, after the uterine arteries have been tied, contains no large vessel. It is clamped with strong crushing clamps, divided, and the divided surfaces are seared with Paquelin's cautery before the clamps are removed. Hæmorrhage from the vaginal wall is easily arrested by applying Wertheim's vaginal forceps furnished with augmented crushing power to the portion of the vagina to be divided for a moment before division. By these measures perfect hæmostasis is secured, and the pelvic wound is perfectly dry. Additional advantages of this method are that the cauterizing of the parametrium will destroy any cancer cells which may be present in the seared portion, and that no ligatures which may act as sources of irritation or infection are left in the pelvic wound. Wertheim's forceps, which are only intended for securing these structures preparatory to ligaturing them, have little crushing power and are unsuitable. The instruments which I have had made for me by Down Bros. possess sufficient crushing power for the purpose. They are also made with shorter handles, which, while quite long enough for any case, render them much more handy to apply. The vagina is crushed and cauterized before removal of the clamp in the same way. The peritoneum is finally sewn over and the abdominal wound is closed in layers. If any bleeding occurs it is from veins opened in separating off the bladder at the side of the cervix, and a ligature or two may be required here; if it takes the form of general oozing with no vessel to ligature adrenalin will sometimes arrest it, otherwise some gauze packed into the bleeding area with an end thrust through the vagina suffices. This, as I have said, is removed in twenty-four hours. I have adopted the method above described in ten consecutive cases. In none has there been any bleeding. I submit it to the Section as an easier, quicker, and better way of performing this part of the operation.



Parametrium crushing clamp.



Vaginal crushing clamp.

Specimens of forceps shown.

Specimen of Wertheim's abdominal panhysterectomy for malignant adenoma of the cervix, which obstructed delivery and rendered Cæsarean section necessary.

DISCUSSION.

Dr. HERBERT SPENCER welcomed this detail in technique from one who had had considerable success with the ordinary technique of Wertheim's operation. The speaker had had twenty-three years' experience of the cautery in the treatment of cancer of the cervix and was of opinion that for early cases of squamous carcinoma the results with the cautery were not equalled by those of any other operation. But for other cases the extended abdominal operation had many advantages, and he had eight years ago performed it by means of the galvano-cautery without using the ordinary knife. Serious hæmorrhage in one case had led him to abandon it for the ordinary Wertheim technique; he had also used Skene's cautery clamps (which had been improved by Down), but thought the same objections applied to them. Mr. Childe's ingenious method of using the forceps *and* cautery seemed to be a step in the right direction, and he would try it. He called attention some years ago to the fact that Werder (one of the pioneers of the extended abdominal operation) had abandoned it for the vaginal operation with the cautery, and had more recently performed the abdominal operation also with the cautery, with very good results.

Mr. DOUGLAS DREW thought that the important point emphasized by Mr. Childe's paper was that the chief danger of Wertheim's operation was sepsis in one form or another; Mr. Drew had had two deaths from this cause, one from secondary hæmorrhage on the twelfth day, and another from a chronic form of septicæmia with patchy thrombosis of the superficial veins some weeks after the operation, but he had not lost a patient from shock. Mr. Drew found that a considerable amount of time was occupied in applying ligatures to the pericervical tissue, and he thought that the method advocated by Mr. Childe would result in a saving of time, and had the additional advantage that ligatures, which might become septic, were not necessary.

Dr. ANDREWS said that he was much interested in Mr. Childe's account of his use of the cautery. He had not used it himself, but intended to do so in the future. He had never employed drainage after Wertheim's operation except once with a large rubber tube, and had only once or twice inserted gauze when oozing was troublesome. He considered that gauze acted as a plug much more than as a drain. He had seen one case of serious bleeding from the right round ligament after a hysterectomy for fibroids.

Dr. CUTHBERT LOCKYER was extremely interested in the innovation introduced by Mr. Childe into the technique of Wertheim's operation for carcinoma of the cervix uteri. He would certainly try the clamp and cautery method himself and was personally grateful to Mr. Childe for the suggestion; it must result in materially shortening the duration of the operation—probably by as much as twenty minutes. With reference to other details in technique adopted by Mr. Childe, the speaker was of opinion that most operators had long ago given up the gauze drain. Dr. Lockyer gave it up as long ago as 1906 on the suggestion of Mr. Carlton Oldfield, of Leeds, and the result was a diminution of sepsis and an absence of trouble with micturition. Dr. Lockyer's cases seldom required the use of the catheter after operation. The speaker still felt the absolute necessity of careful preparation of the cervix before operation ; a redundant growth should be scraped and cauterized several days prior to hysterectomy, and he approved of Dr. Vaughan Sawyer's plan of keeping it dry by swabbing with acetone. Instead of subsequent douching the vagina should be packed with dry (preferably bismuth) gauze daily and an end of gauze should be left outside the vagina so that it could easily be withdrawn by a nurse before the vagina was divided at the operation.

Dr. TAYLOR YOUNG (Sydney, N.S.W.) said he had not intended taking part in the discussion, but after the very kind invitation of the President to do so, felt he must take advantage of it, if for nothing else than to express his pleasure at being present at a meeting of the Section. It was a long cry from Sydney to London, and members from there seldom had an opportunity of taking part in a meeting of what must be called the parent society of obstetrics and gynæcology. He desired to congratulate Mr. Childe on his paper and on the good results recorded in that paper, but at the same time it was with a feeling of great surprise he heard, here in London, the use of the thermo-cautery being referred to as if it were something new and rather unusual. Fully eighteen years ago, before Wertheim's operation, as such, was known, the thermo-cautery had been used in Australia when dealing with cases of malignant disease, and it was most gratifying to know that although so far removed from "the hub" those who lived in Sydney were so up to date. Possibly that state of affairs might be ascribed to the literature obtainable there, or perhaps to the observation of those engaged in gynæcology who from time to time took the long trip and on their return gave the benefit of their knowledge to their brethren. On one point he desired to compare notes with Fellows in London, and that was as to the percentage of successful cases. Possibly because of the better climatic conditions and the consequently better resisting powers of patients, he felt inclined to think that Australian surgeons would be disappointed if they had not more satisfactory results to record than those mentioned to-night. As to the use of gauze, he could remember many occasions when he regretted not having used it, but was unable to recall a case where he was sorry for having used it, and he could not possibly understand the statement made by one of the speakers—viz., that gauze was of no use as a hæmostatic!

Mr. CHILDE, in reply, said he felt gratified by the favourable reception which the method he had advocated for dealing with the parametrium and the vagina had met with at the hands of the various speakers, and hoped they would convince themselves of its superiority over the ligature by giving it a practical trial. It provided an ideal pelvic wound, perfectly dry, with a thin scar in the track of the cautery, and without tissues strangled by any ligatures.

It also greatly facilitated and hastened this, which was the most difficult stage in the operation; he reckoned the saving of time at about twenty minutes. With regard to the round ligament, he always crushed it firmly before dividing it, and if this were done in the cases he was dealing with in his paper, it would never bleed. As regards scraping away the growth as a preliminary step some days before the operation, in fungating growths he always did this, but what he wished to urge was that even in cases in which this had been done the growth should be treated again with the sharp spoon and cautery and finally the vagina should be plugged with sterile gauze just before the operation. If this were done when the vagina was divided not a drop of discharge was to be seen. Since adopting this technique he had had no case of infection of either the abdominal or pelvic wound. The vaginal discharge after the operation was almost *nil*.

Tubo-ovarian Cyst with Intracystic Carcinomatous Growth.

By Walter Tate, M.D.

Mrs. H., aged 42, had had three children, the last four and a half years ago. The patient had always suffered from excessive periods, but during the last twelve months the losses had been much more severe and were described as floodings. For six weeks before her operation she had remained in bed, on account of continuous hæmorrhage and marked anæmia. A tumour had been noticed by the patient for six months, and during that time it had steadily increased in size.

On examination the patient was markedly anæmic. There was a firm but elastic swelling reaching up to the level of the umbilicus and extending outwards towards the left iliac region. *Per vaginam* the uterus could not be made out separate from the swelling, and the latter appeared to be a distinct expansion upwards from the cervix and lower uterine segment. The tumour extended more to the left side and moved with the cervix. The clinical history and physical examination of the patient suggested that the tumour was a fibromyoma of the uterus undergoing cystic degeneration.

On opening the abdomen there was a small amount of free fluid. The tumour, which was as large as a coconut, was seen to be a cyst of the left ovary which had burrowed between the layers of the broad ligaments, and presented some coils of small intestine adherent above. The uterus was pushed a little forward and to the right and was in close proximity to the swelling. Adhesions of bowel having been separated, the tumour was enucleated from the broad ligament and removed. The right ovary was cystic and inflamed and was removed with the tube. Owing to the severe menorrhagia from which the patient had suffered it was thought advisable to remove the uterus, which was enlarged and fibrotic, but presented a healthy endometrium.

Parts removed: The tumour was a thin-walled cyst containing clear fluid and some masses of inflammatory lymph.

The Fallopian tube, which was considerably thickened and its lumen dilated, ran along the outer side of the cyst wall and opened into it.

Microscopically the intracystic growth appears to be primarily of a papillomatous nature. It consists of thick masses of epithelial cells of the cubical type, but in the thicker masses they have become spheroidal and polygonal. These epithelial projections are supported on a fibrous tissue core and the infiltration of this core by small columns and masses of epithelial cells leads to the conclusion that the growth has become carcinomatous. A search of the tissue in the neighbourhood of the pedicle has revealed no trace of ovarian tissue, and the assumption is that the specimen is a tubo-ovarian cyst.

DISCUSSION.

The PRESIDENT (Dr. Amand Routh) asked why Dr. Tate called this a malignant papilloma. It was said to be impossible to determine the difference between a benign and malignant papilloma. A benign intracystic papilloma seemed to be liable to take on malignant characters if it reached the peritoneum by rupture of the cyst. It was well known that papillomatous growths of the ovary invading the peritoneum sometimes got well after exploratory operations even if the growth could not be removed. This might also occur where the growth had spread to distant organs, in that respect acting similarly to some cases of chorionepithelioma of moderate malignancy.

Dr. TATE, in reply, said that the border-line between innocent and malignant papillomatous tumours was sometimes very difficult to define. He thought the infiltration of the fibrous tissue core was evidence of malignancy. In some cases the question of malignancy could only be decided by the subsequent history of the case. The Fallopian tube showed evidence of chronic inflammation, but did not contain any growth. The wall of the cyst which was free from growth had not been examined microscopically.

VALEDICTORY PRESIDENTIAL ADDRESS.

By Amand Routh, M.D.

It is the pleasant task of a President, at the end of his term of office, to give a review of the scientific work of the Session, alluding first to any special public matters which might have engaged the attention of the Council.

National Insurance Act, 1913.—Between March, 1912, when the Commissioners published their model rules, and January 15, 1913, when the National Insurance Act became operative, the Council was engaged in efforts to ensure that the obstetric training of medical students and pupil midwives should not suffer, and it is satisfactory that, so far as can be at present ascertained, the opportunities for clinical instruction do not appear to be diminished.

During the session the Section has suffered severe loss by death of several distinguished members, and the Council have sent letters of condolence to their families. Amongst the members who have died are: Sir William Japp Sinclair, Mr. Stanmore Bishop, Dr. Alfred Lewis Galabin, and Mr. James Henry Targett.

Obstetric Instruments.—When the Obstetrical Society of London amalgamated with the British Gynæcological Society and together formed a Section of the Royal Society of Medicine, its collection of instruments and of anatomical wax casts and osteological specimens became the property of the Royal Society of Medicine. By desire of the Council of the Section of Obstetrics and Gynæcology (Resolution of Council, January 5, 1911), the *Osteological* Collection was presented to the Royal College of Surgeons on January 13, 1911. The *Obstetrical Instrument Collection* included numerous midwifery forceps and other mechanical aids to assisted delivery, which had been at different times presented to the Obstetrical Society of London. This collection also included, as a specially valued heirloom, a Baudelocque's cephalotribe, which had been personally invented and used by Baudelocque himself, and was presented by Sir Charles Locock to the Society in 1865. With the approval of our Council all these instruments have been loaned to the Royal College of Surgeons on conditions drawn up by our Council. These conditions have been approved by the Councils of the Royal Society of Medicine and the Royal College of Surgeons. The loan dates from June 12, 1913. The conditions include the right of the Royal Society of Medicine to terminate the loan at six months' notice, and to have the use of the instruments for exhibition purposes on giving due notice to the Royal College. The list of instruments now at the Royal College of Surgeons has been revised by Mr. Alban Doran and Dr. Herbert Spencer. Mr. Alban Doran, a Past President of the Obstetrical Society of London, has devoted much time and research to this collection since it has been at the Royal College of Surgeons, and has published in the *Journal of Obstetrics and Gynæcology of the British Empire* several valuable historical papers on some of the included instruments. The thanks of the Section are due to Mr. Doran for his energy and skill in rendering this unique collection of instruments better known.

Definition of Stillbirth.—Early during the current Session our Council was invited by the Royal Statistical Society to supply them with a well-considered definition of stillbirth in view of a discussion to be held by that Society. The Council appointed a sub-committee, consisting of its President, Secretaries, and Dr. Walter Griffith, and the following definition was formulated, and approved by the Council:—

> "*A stillborn child means a child which measures more than 13 in. in length from the top of the head to the heel, and which, when completely extruded from the body of the mother (head, body, and limbs, but not necessarily the after-birth), exhibits no sign of life by crying or breathing, or by pulsation in the cord at its attachment to the body of the child, or by beating of the heart.*
>
> "*N.B.—The final test of life is the pulsation of the heart, but this can only be ascertained by an expert.*"

Dr. Walter Griffith and your President attended the Discussion, and represented the views of our Council, which were generally approved by the meeting. An international discussion on the subject is shortly to be held, and the definition will then receive more extended criticism, but I fear that, owing to the extraordinary divergence of views held on "stillbirth" in different countries, no international definition is yet possible.

REVIEW OF THE WORK OF THE SESSION.

OBSTETRICS.

The Physiology of Pregnancy.

The Intra-abdominal Pressure in Pregnancy.—At the June meeting *Dr. R. H. Paramore* read a paper with the above title as a preliminary to another more important one which is to endeavour to prove that the toxæmias of pregnancy are caused mechanically by exaggerated increase of intra-abdominal pressure and not to biochemical causes. His contention at the June meeting was that the increase of pressure in pregnancy was only in part due to increase of visceral weight, and was mainly caused by the concerted reactions of the musculature of the abdominal wall, the diaphragm and the pelvic floor. In the discussion which followed Dr. Paramore's views did not meet with approval, and he will need to advance more scientific proof if his views are to be adopted.

The Pathology of Pregnancy.

Ectopic Gestation.—*Dr. Russell Andrews* at the November meeting showed a remarkable specimen of interstitial, associated with intra-uterine pregnancy. The Fallopian tube was absent on the side of the interstitial pregnancy, so that internal wandering of the ovum had almost certainly occurred. *Dr. Herbert Williamson* in December showed a unique specimen of gestation in a Fallopian tube stretched over a broad ligament cyst. The specimen showed that rupture of the gestation sac into the cyst could have easily occurred. Bearing upon ectopic gestation, *Dr. Macnaughton-Jones* in December exhibited a tubal hæmatoma in a woman who had previously had a gravid tube removed from the opposite side. No chorionic villi were discoverable in this hæmatoma, so that a repeated ectopic pregnancy could not be proved. *Dr. Gordon Luker* at the same meeting showed a specimen where a hæmorrhagic corpus luteum had ruptured into a broad ligament cyst. The symptoms and physical signs had led to a diagnosis of ectopic pregnancy.

Primary Ovarian Pregnancy.—At the April meeting *Dr. Frederick McCann* showed a specimen of this rare condition removed by abdominal section at the fourth month. The fœtal sac was removed entire and the woman recovered. The tumour was found to consist of a distended ovary containing a multilocular cyst and an ovarian pregnancy in apposition. The combination is probably unique.

Hydatidiform Degeneration of the Chorion.—At the October meeting *Dr. Henry Briggs*, of Liverpool, narrated another case of this condition to add to the details of twenty-three cases described by him in January, 1912, with a view to prove that, as a rule, unless extravasated blood be also present, a uterus containing a hydatid mole is smaller than a normal gravid uterus of the same duration.

Chorionepithelioma.—At the April meeting *Dr. Thomas Wilson*, of Birmingham, described an interesting case of this disease. The patient nearly died of intraperitoneal hæmorrhage two months after the removal of a hydatidiform mole, and one month after metrorrhagia had recommenced. At the abdominal section, which was made by a transverse suprapubic incision, free bleeding was discovered to be going on from a vein in a rent on an eroded patch on the back of the right mesosalpinx. The Pathology Committee considered that the chorionepitheliomatous elements found in the blood clot at the site of the rent were embolic, as the structures immediately surrounding were healthy.

Chorionepithelioma of the Fallopian Tube.—At the same meeting *Mr. Zachary Cope* and *Dr. E. H. Kettle* read a valuable paper on a case of chorionepithelioma of the Fallopian tube. They also gave details of fourteen other cases, including the remarkable case of Dr. Miles Phillips, of Sheffield, whose patient was one of the two who survived. The authors show that the symptoms usually point to three stages in the clinical history: (1) tubal gestation, (2) a quiescent period, and (3) a period of tumour formation with pain and wasting. The authors urge that efforts should be made to remove all the growth, but allude to complete recoveries which had sometimes taken place, as in Dr. Miles Phillips's tubal case, and in other uterine cases, where some of the growth had been left, and where secondary deposits had been diagnosed in the lungs and other organs.

Blood Mole.—In January *Dr. T. W. Eden* exhibited a uterine blood mole showing a low implantation of the ovum (placenta prævia). A similar specimen was exhibited by Dr. Walter Griffiths in 1893.

Puerperal Eclampsia.—Several cases of this disease have been narrated during the session, but until we know with certainty the source and nature of the toxæmia producing the convulsions we cannot dogmatize on the methods of treatment. At the November meeting

Dr. Drummond Maxwell related a case treated by Cæsarean section. Dr. Maxwell believes in the placental origin of the toxæmia in eclampsia, and as the patient was a primi-gravida, as coma was deepening and fits were recurring frequently, and as the uterus was inert, he performed Cæsarean section, both mother and child surviving. *Dr. Walter Tate* mentioned a similar successful case operated upon recently by *Dr. John Phillips.* An interesting discussion followed, the author's treatment being criticized by some speakers, and it was universally felt that although Cæsarean section was sound treatment in some cases of eclampsia, it was very difficult with our present knowledge to say when that operation was indicated. If a chemical investigation of the blood could quickly determine the gravity of the toxæmia it would be of great value.

Hydrorrhœa Gravidarum: Bacterial Infection of the Chorion.—At the May meeting *Dr. Napier Burnett*, of Newcastle-on-Tyne, read a suggestive short communication on "Bacterial Infection of the Fœtal Membranes from a Case of Hydrorrhœa Gravidarum." The hydrorrhœa began sixteen days before the patient aborted in the twenty-third week. A patch on the chorion was found to be inflamed and necrotic, with extensive bacterial invasion. He discussed the question whether the bacterial infection of the chorion was the cause of the rupture or was secondary to it, and also the question whether the hydrorrhœa and the bacterial invasion were etiologically associated. This case should lead to more frequent bacteriological examination of the membranes in abnormal pregnancies.

Physiology of Labour.

Cause of Internal Rotation of the Fœtal Head.—A valuable demonstration on the cause of internal rotation of the fœtal head during labour was given by *Dr. James Young*, of Edinburgh, at the February meeting. He considered that the fœtal head, like all firm, cylindrical bodies closely fitting a curved cylindrical canal would be continually changing its position when acted upon by pressure from above, and that its lower end, in contact with the posterior wall of the canal, would be carried forward as the head descended. He thus explained internal rotation of the head and the frequency of the forward movement of the occiput. He successfully demonstrated his views by experiments with pseudo-heads and cylindrical canals. Dr. Young attached less importance to the pelvic floor than is usually done, and thought its chief use was merely to continue onwards the curve of the pelvic cylinder. He believed that the anterior wall has more to do with the rotary movement than the posterior lateral walls. Dr. Walter Griffith and Dr. Paramore discussed the paper, especially emphasizing the view that the resistance of the pelvic floor was an important factor in internal rotation of the fœtal head.

Rupture of the Uterus.—At the May meeting *Dr. Russell Andrews* read a short communication on an unusual case of rupture of the uterus. The perineum was torn and the cervix was lacerated and almost entirely torn from its vaginal and uterine attachments. He performed vaginal hysterectomy, and after a month's pyrexia the patient recovered.

Rupture of the Utero-vaginal Junction.—At the April meeting *Dr. J. Bright Banister* showed a uterus removed by abdominal panhysterectomy. The head had presented and forceps had been used for extraction. In attempting to remove the placenta an extensive rupture was found, the hand passing into Douglas's pouch. The patient eventually recovered.

Diseases of Labour.

The Contraction Ring as a Cause of Dystocia.—*Mrs. Florence Willey, M.D.*, at the December meeting, described the case of a woman who had subperitoneal fibroids, and albuminuria was present at the seventh month. In spite of treatment eclampsia developed during labour, and as a foot presented it was brought down and the child delivered as far as the head, which was retarded by a firm contraction ring. Suspecting a hydrocephalus, though a certain diagnosis was obscured by the fibroids, the spinal canal of the child was punctured and cerebrospinal fluid flowed freely. Steady traction soon enabled the collapsed hydrocephalitic head to pass the contraction ring. The patient recovered, only two fits occurring after delivery, and the albuminuria ceased on the third day. Mrs. Willey was cordially congratulated upon her successful management of a very difficult case. At the same meeting *Dr. Clifford White* read a practical and well-reasoned paper on the same subject, drawing well-defined distinction between a "contraction ring" and a "retraction ring." He showed that apart from obstructed labour a local uterine "contraction" might occur which would fit into fœtal depressions, such as the neck. In such a case of "contraction ring" there would be no thinning of the uterine wall below the ring, and there would be no tonic contraction of the uterus above it. Dr. White advises that the resulting dystocia should be treated by continuous traction, such as the method of "Weight-traction" advocated in suitable cases by Dr. J. A. Willett in our Section in June last year. If traction fail, he prefers Cæsarean section to embryotomy, provided that the presenting part is above the contraction ring. An excellent discussion by nine members followed these papers, Dr. Eardley Holland reading a case described by Smellie in 1743. Most of the speakers agreed with Dr. Clifford White's conclusions.

Cæsarean Section.

This operation has been recommended for various conditions during this session. As we have just seen, *Dr. Clifford White* recommends it for some cases of dystocia due to a "contraction ring." I have also alluded to a case of puerperal eclampsia described by *Dr. Drummond Maxwell*, where he successfully performed abdominal Cæsarean section, saving both mother and child.

Dr. Hubert Roberts read notes of a Cæsarean section performed in a case of prolapse of the cord in a woman with a contracted pelvis, both mother and child being saved. The case was somewhat "suspect" owing to previous interference, and the convalescence was septic. This led Dr. Roberts to think it might have been wiser to have removed the uterus.

GYNÆCOLOGY.

Adopting Dr. Fothergill's pathological arrangement, as advised in his communication to our Section last session, I have first to allude to—

Developmental Errors at Birth and Puberty.

Hæmatocolpos.—At the October meeting *Dr. Drummond Maxwell* read notes of a case of hæmatocolpos in a married woman, aged 19, who had consulted him for dyspareunia. Menstrual molimena were absent. A tense cystic intrapelvic swelling was felt *per rectum* and was thought to be a hæmatometra, with probable involvement of the tubes. He opened the abdomen and found that the cystic body was a distension of the upper end of the vagina, the uterus being normal. The lower end of the vagina was not canalized. He burrowed through this solid portion of the vagina till he reached the distended portion. He then separated this distended vaginal tube from its lateral paravaginal cellular tissue, and after letting out a pint of tarry fluid drew down the vaginal tube and stitched it to the introitus vaginæ. Dr. Maxwell made many sections of the vaginal wall, comparing his results with previous sections by Blair Bell, Victor Bonney, Glendining, and others. The discussion turned mainly upon the need of performing abdominal section in cases of congenital atresia with retained menses where the uterus and tubes were distended. Dr. Blacker, Dr. Russell Andrews and Dr. Herbert Spencer thought such a procedure was desirable. Dr. Walter Griffith, Dr. Briggs, Dr. Eden and the President thought it unnecessary under ordinary circumstances.

Ovarian Teratoma.—At the November meeting *Dr. Russell Andrews* showed a remarkable specimen of an ovarian teratoma containing brain and intestine in addition to sebaceous matter and hair. It was removed from a woman, aged 29, who had had six children and believed herself to be two months pregnant. There was some question as to whether the specimen should be termed a dermoid or a teratoma, but as in addition to the nerve tissue and glia cells present, the intestine was found not only to have its muscularis mucosæ and its submucosa, but also a flattened mucosa, it is no doubt correct to call it a teratoma. The ætiology of such formations and the kind of stimulus required to start them, are matters of great interest not dwelt upon by Dr. Andrews.

Mechanical Lesions.—At the same meeting (November) *Dr. J. M. Wyatt* read a paper on Le Fort's operation for prolapsus uteri, giving references to eight cases operated upon by Dr. Walter Tate, and to two more recent cases of his own. The operation is a revival and extension of one performed in 1872 by Spiegelberg, and consists of stripping off a vertical slice of mucous membrane from the opposing walls of the vagina and uniting the raw surfaces together by suturing. In some of the cases Dr. Tate had also performed a perineorrhaphy. The results were in most cases excellent ; Dr. Wyatt did not advise that the operation should be performed on women during sexual life, as coitus was rendered impossible, but for elderly women with procidentia it had proved a very satisfactory operation. Dr. Walter Griffith, Dr. Cuthbert Lockyer, Dr. Walter Tate and Dr. Eden all spoke highly of the operation for elderly women.

"*Ventrifixation*" *of the Uterus.*—Our Council arranged for the

March meeting to be devoted to a discussion on ventrifixation of the uterus. They were encouraged to do this by the papers published in the *Journal of Obstetrics and Gynæcology of the British Empire* in 1910 by Dr. A. E. Giles, who gave details of 309 cases of ventrifixation out of 1,000 consecutive cases of abdominal operations on the pelvic organs, a proportion of nearly one in three. It was also known that Dr. Henry Briggs, of Liverpool, had performed the operation 600 times. Much difference of opinion on the subject was known to exist. It was hoped that a discussion on the subject would show where the difference of outlook lay. The Council therefore asked *Dr. Walter Griffith* to open the discussion from the point of view of "Indications" for the operation, and *Dr. Henry Briggs* and *Dr. Giles* on the "Technique" and "Results" respectively. Dr. Giles was able to add 199 cases of ventrifixation to the 309 already published by him, and Dr. Walter Griffith gave details of 77 cases, so that the three papers were the result of the experience of 1,185 cases. A most interesting and valuable discussion followed. It was clear that the large majority of the speakers were not possessed of the enthusiasm for the operation evinced by Dr. Henry Briggs and Dr. Giles. Dr. Walter Griffith, in his introductory paper on the "Indications," had not definitely differentiated between the indications for primary and for accessory hysteropexies, probably because it is extremely difficult to divide the subject in this way. Unfortunately figures showing the proportion of the primary to the accessory ventrifixation operations in the 1,100 operations of Dr. Briggs and Dr. Giles were not available at the discussion. Many speakers, notably Dr. Handfield Jones, Dr. Fairbairn and Dr. Hubert Roberts, thought it a pity that the discussion was not limited to primary ventrifixation, and they wished to know the precise circumstances, subjective and objective, which led the authors to advocate ventrifixation in those cases where, roughly speaking, the only objective condition was a prolapsed uterus in a position of retroversion or retroflexion. They argued, rightly I think, that when the laparotomy was primarily done for the removal of a fibroid, an ovarian tumour, or inflamed appendages, the hysteropexy became merely a detail in the operation, adding nothing to the risk, and preventing the after-history being considered from the point of view of the hysteropexy alone. In Dr. Giles's original paper, out of the 309 ventrifixations, 189 were primary, whilst 27 were associated with myomectomy, 62 with ovariotomy, and 31 with pelvic inflammation. It was acknowledged that there was a risk in the operation, Dr. Giles having lost two cases in his first 189[1] primary ventrifixations, and Dr. Briggs three in his total of 600, and that in addition there were post-operative risks which were not entirely due to faulty technique. The question largely resolved itself into the difficulty of deciding under what circumstances the surgeon should rightly advise his patient to run the slight risk of its performance. In addition to those already named as having adversely criticized the primary operation, Dr. Herbert Spencer, Dr. Munro Kerr, Dr. Archibald Donald, Mr. Beckwith Whitehouse and the President were all agreed that the conditions for which Dr. Briggs and Dr. Giles had performed their primary operations could, in many cases, have been met by other general measures, or by plastic or other minor operations of less immediate and subsequent risk. Dr. Macnaughton-Jones, Dr Arnold Lea, Dr. Frances Ivens and Dr. Walter Tate, like Dr. Walter Griffith, had found the operation more useful than the other speakers, but had not found it necessary to adopt it with such relative frequency as Dr. Briggs and Dr. Giles.[1] On the whole the discussion was valuable and led to useful leading articles in the *British Medical Journal* and *Lancet*, both tending to emphasize the view held by the majority of speakers that the operation was not required in anything like the proportion of one in three or four abdominal operations upon the pelvic organs, but that in a relatively few cases it had a useful application when other measures failed or were manifestly unsuitable.

Foreign Bodies.—Dr. Russell Andrews described a case where 8 in. of a celluloid bougie had been passed through the uterine wall and had been retained in Douglas's pouch for six weeks. Three days before being seen by Dr. Andrews another attempt to dilate the uterus was made with metal dilators and one of them (No. 9) disappeared. X-rays showed its presence in the abdomen, and Dr. Andrews performed laparotomy. The woman recovered without incident. *Dr. Blacker* also showed a portion of a bone knitting needle $6\frac{1}{2}$ in. long, which a patient had tried to pass into the uterus to procure abortion. Severe pelvic inflammation followed and she aborted on the sixth day. An X-ray photograph showed the position of the bone needle to the right of the lumbar vertebræ. Dr. Blacker performed abdominal section, when offensive pus welled up from Douglas's pouch. The needle was found to be beneath the peritoneum, its point projecting at the sacral promontory. The peritoneum was incised over the needle, which was then removed. Abdominal and vaginal gauze drainage was adopted, and the woman eventually recovered after a critical convalescence, fæcal matter coming from the abdominal wound and a coli-cystitis being present. *Dr. W. H. C. Newnham*, of Clifton, showed a similar needle, inserted also by the patient herself to procure abortion. The bowels were extensively matted, but he was able to extract the needle from between two coils, and the patient recovered well. The *President*, *Dr. Heywood Smith*, and *Dr. Giles* described similar cases.

---

[1] July 8, 1913.—Dr. Arthur Giles has kindly sent me the following corrected figures: Total abdominal operations upon the pelvic organs, 1,850; total ventrifixations, 569; proportion 30·7 per cent., or 1 in 3·2. Total "primary" ventrifixations, 368; proportion, therefore, of "primary" to total ventrifixations is 61 per cent., and of "primary" ventrifixations to abdominal operations upon the pelvic organs, 19·8 per cent., or 1 in 5. Dr. Giles had seven deaths in his 569 ventrifixations (1·2 per cent.), including three in his 368 primary cases (0·82 per cent.).

Perforation of the Uterus.—At the April meeting *Dr. F. J. McCann* showed a uterus which he had removed by abdominal panhysterectomy, after an abortion ten days previously. Six days before admission to the Samaritan Hospital the patient's local doctor had curetted the uterus, and the fundus was probably then perforated. Some hours before admission a cyllin douche had been given, but it did not return, and intense abdominal pain ensued. Ten days after Dr. McCann's operation, when apparently convalescent, broncho-pneumonia developed and the patient died. Similar cases were described by *Dr. Russell Andrews* and others.

Progressive Conditions including New Growths.

Fibromyomata Uteri.

Red Degeneration.—A valuable contribution to our knowledge of the red degeneration in fibromyomata of the uterus was made at the February meeting by *Dr. Lorrain Smith*, of Edinburgh, and *Dr. Fletcher Shaw*, of Manchester. The paper showed that there were two main varieties of red degeneration; one in which thrombosed vessels were found, the other where they were absent. The former, which owed its colour to hæmoglobin staining, was liable to further degeneration and to cause toxic symptoms; the latter, which owed its colour to the presence of free blood, rarely produced constitutional or local symptoms. In the discussion which followed Dr. Fairbairn hoped that further work on the subject would enable the authors to discover whether the thrombosis was primary or secondary, so that the causation of the red degeneration could be discovered. Dr. Paramore drew attention to the marked frequency of red degeneration during pregnancy, and the resemblance of the condition to that found in the liver and kidneys in cases of toxæmia during pregnancy.

Cysts of the Ovary.—At the October meeting (October 9), *Dr. Thomas Wilson*, of Birmingham, read a valuable paper on "Gelatinous Glandular Cysts of the Ovary and their connexion with the so-called Chronic Pseudo-myxoma of the Peritoneum." Some of the glandular gelatinous cysts are benign and others—often called "colloid cancer"—malignant. Ovariotomy in the latter cases often leads to a fatal result, so-called "pseudo-myxomatous peritonitis" being also usually present, as a result of one or more of the cyst cavities having previously burst. In some instances true metastases develop at a distance from the rupture. The loculi containing the gelatinous material are divided up into smaller cavities by fine septa lined by columnar secreting epithelium. The chronic peritonitis is due to attempts at absorption and encapsulation of the gelatinous material, but in malignant cases the encysted epithelium cells preserve their vitality and continue to develop. This variety of peritonitis has also been found in a few instances to have originated in the vermiform appendix. Dr. Wilson advised total removal of the cyst and of the whole of the gelatinous effusion, and said this could best be done by copious flushing with normal saline solution.

Diffuse Ovarian Fibroma with Central Cyst.—This specimen was shown by *Dr. Arthur Giles* in February. The tumour had filled the pelvis. He took the opportunity of giving an analysis of his 400 operations upon ovarian neoplasms. It showed that 32 were malignant, 368 benign; of the benign cystic tumours 39 were dermoid, and 13 papillomatous. There were four fibromata and four fibro-adenomata.

Renal Cyst.—At the January meeting *Dr. Lockyer* showed an enormous renal cyst simulating an ovarian cyst. The operation was difficult owing to its retroperitoneal position and its adhesions to bowel, and the great vascularity of its coverings. In reply to Mr. Malcolm, he gave reasons why he did not consider it to be a hydronephrotic kidney.

Cancer of the Pelvic Organs.—A good many specimens illustrating malignant disease have been exhibited, but unfortunately none of these cases bring us any nearer to a knowledge of the causation and frequent occurrence of carcinoma of the pelvic organs, nor do they point to any procedure, other than surgical, for its relief. The recent valuable discussion in February and March at the Therapeutical Section on the "Non-operative Treatment of Malignant Disease," emphasizes this latter regrettable fact.

Wertheim's Operation for Cancer of the Uterus.—No discussion has taken place on the indications for *Wertheim's operation for cancer of the uterus* during the Session, and this is, I consider, a correct attitude at this early date. The value of the operation can only be determined by a large series of operations, for it is not merely the question of the immediate risk of the operation which has to be considered, but the questions of permanent cure, or, alternately, of the frequency and date of recurrence of the growth. The duration of life after the operation, as compared with the probable duration of life if no operation had been done, and the comparative comfort and well-being of the patient under the two conditions, must also be considered. The operation is being done mainly by the younger surgeons, and we older gynæcologists are willing to be largely guided by the consensus of opinion which will be arrived at when sufficient time has elapsed to make the answers to the above considerations decisive. Meanwhile papers like that of *Mr. Charles P. Childe* to-night upon the technique of the operation are of great value.

Sarcoma of Uterus.—At the April meeting *Dr. Handfield Jones* showed two specimens of spindle-celled sarcoma of the uterus, and he suggested that the sarcoma in these cases was a form of degeneration of pre-existing fibromyomata. The Pathology Committee, however, considered that "the evidence of their origin from fibroids is wanting." The evidence that fibromyomata ever degenerate into sarcomata is small, though there are many cases where sarcoma has developed *de novo* in a pre-existing fibromyoma.

Endocervical Cancer.—At the January meeting *Dr. Eden* showed a specimen of endocervical cancer with distension of the uterine cavity and associated with a remarkable thinning of the walls, which in some places were no thicker than brown paper.

Perithelioma of the Uterus.—In March *Mr. Beckwith Whitehouse* showed an enlarged uterus removed with the inflamed appendages. The uterus was supposed to contain a fibroid, but on section the small tumour was clearly not of that nature, and microscopically Mr. Whitehouse thought it to be a mixed celled sarcoma. The Pathology Committee considered it to be a perithelioma, and to be a tumour of a low type of malignancy.

Tumours of Doubtful Character.—In January *Dr. Cuthbert Lockyer* read a paper on "A Growth of the Recto-uterine and Recto-vaginal Septa, deeply involving the Cervix Uteri and the Rectal Wall." Dr. Lockyer felt compelled to remove both the rectum and the uterus, beginning the operation as in a Wertheim's panhysterectomy by dissecting out the ureters. He then drew down the sigmoid and brought it out through a fresh opening in the left iliac region to form a permanent colotomy. The patient recovered. The growth proved to be an adenomyoma, histologically benign, yet the cervix and anterior vaginal wall were invaded by it. Dr. Lockyer suggested that the growth arose from vestigial remains of the Wolffian duct, whereas Dr. Blacker thought it of Müllerian origin, and Dr. Herbert Spencer said they might spring from the peritoneal endothelium. In the discussion somewhat similar cases were mentioned by Dr. Macnaughton-Jones, Dr. Clifford White, and the President. At the March meeting Mrs. Scharlieb showed a tumour somewhat resembling Dr. Lockyer's in its structure and probable ætiology. It was removed from the groin of a multipara, aged 30. The Pathology Committee considered the tumour to represent Wolffian relics and to be benign.

Intra-uterine Nodule of Embryonic Origin resembling Enchondroma.—In January Dr. Lockyer showed this curious specimen removed with a curette by Professor Coe, of New York, from the uterus of a married multipara. There had been normal periods for the first nine months after an abortion twelve months earlier, but amenorrhœa for the three months previous to the curettage. Doubts were expressed by Dr. Lockyer himself, Mr. Shattock and Dr. Arthur Keith, as to whether the nodule was an osteochondroma, or either embryonic or teratomatous in origin, but the Pathology Committee, with Dr. Lockyer in concurrence, considered it to be "Embryonic and a relic of a previous pregnancy."

Pancreatic Cyst simulating Ovarian Tumour.—At the April meeting Dr. F. J. McCann showed this specimen. The cyst had been tapped nine months previously, and a digestive ferment had been found in the glairy fluid removed. A correct diagnosis was made. The operation was difficult owing to the vascularity and attachments of the cyst. The patient recovered and has remained well.

Nervous Supply of Mammalian Ovaries.—At the April meeting Dr. W. Abel and Dr. Louise McIlroy gave an epidiascope demonstration of the arrangement and distribution of the nerves in the ovaries of the cat, dog, and rabbit. The demonstration was an important one, and apart from its own merits will be valued as a preliminary to similar research on the nervous supply of the human ovary.

Miscellaneous.—Dr. Macnaughton-Jones gave an interesting epidiascope demonstration of some of the operating theatres on the Continent.

showing the method of lighting by means of the arc light and reflecting mirrors, and both he, Dr. Herbert Spencer, and Dr. Eden, testified to the great value of the method.

OBSERVATIONS ON THE TOXÆMIAS OF PREGNANCY, AND ON EUGENICS FROM THE OBSTETRIC STANDPOINT.

Eugenics, or the well-being of the race, is now one of the prevailing instincts of our generation. The value of the potential mother and her unborn babe to the nation is becoming increasingly recognized. I propose to examine the subject very shortly from the obstetrical standpoint.

(I) *The Medical Importance of Eugenics from the Obstetric Standpoint.*

The crux of the whole question is the safety of the mother and child during pregnancy, labour and the puerperium. The fact that over 3,000 women (3,179 in 1909) die every year in England and Wales from puerperal septic disease and accidents of childbirth, and that in the same year 99,430 infants died during their first year of life, and that in addition there were about 19,000 stillbirths, make this statement a self-evident truth. To lessen this terrible death-rate is one of the main objects of the Royal Society of Medicine, and more especially of its Obstetric Section.

It will not be possible to speak now of many of the causes of this maternal and infantile mortality, but before touching upon the general question I would like to say a few words on the efforts being made to unravel the pathological mysteries of the toxæmias of pregnancy which directly or indirectly cause a large proportion of this terrible waste of life.

The Toxæmias of Pregnancy.

In my Presidential Address of October, 1911, I alluded to several diseases both in obstetrics and gynæcology, the ætiology or pathology of which was to a large extent undecided, and amongst them I instanced in obstetrics the toxæmias of pregnancy, ectopic gestation, phlegmasia alba dolens, pyelonephritis of pregnancy and hydatidiform degeneration of the chorion, with its not infrequent sequela, chorionepithelioma.

As regards the toxæmias of pregnancy I drew attention to the increasing recognition of the fact that investigations must be made by physiological and pathological chemists regarding the autotoxins, if our knowledge of the ætiology and treatment of the resulting diseases is to be increased. In printing my Address, the *British Medical Journal*[1] published a leading article entitled "Where Chemistry and Medicine Meet," and the *Lancet*[2] also published an article on "The Return to Chemistry," both expressing their cordial concurrence with my views. These leading articles helped materially to stimulate interest in the subject. There is no doubt that during these last two years more progress has been made in our knowledge of the functions of the placenta and of the function and interaction of the ductless glands, including the ovary and its lutein tissue, than was previously possible. Dr. Blair Bell and Miss McIlroy, members of our Section, have been working on these lines for some years, but a whole army of experts are now engaged in this form of research. If the foreign journals are examined, more particularly the German, it will be seen that this chemical investigation and the effects of injection of glandular extracts is becoming increasingly prominent.

As further evidence of the interest being now attached to the chemical aspect of the toxæmias of pregnancy, I would allude to the large numbers of books recently published on the "Internal Secretory Organs" or on "The Function of the Ductless Glands," the authors in every case dealing with the influence exerted by the secretions of these organs upon menstruation, pregnancy, lactation and the puerperium in both animals and man.

The clear advice in the Report of the Royal Commission on the University of London as to the need of the perfect equipment of "the Hospital Unit," is only another indication that it is now being generally recognized that clinical work can only be scientifically and satisfactorily carried on if the medical officer in charge has at his disposal laboratories suited for the complete examination, treatment and demonstration of every case. Such laboratories would, according to Sir William Osler, be devoted to physiology, bacteriology and vaccine therapy, biochemistry, microscopy, X-ray and electrical work, and a general laboratory for the students.

At our London Hospitals all these laboratories to some extent already exist for the general use of the staff, except perhaps the biochemical laboratory as a separate entity, and it is this particular form of research which, in my opinion, is now the most important desideratum for the efficient and scientific management of every obstetric and gynæcological hospital unit.

---

[1] *Brit. Med. Journ.*, 1911, ii, p. 1118.

[2] *Lancet*, 1911, ii, p. 1085.

Another innovation which points in the same direction is the constitution for the first time of a Sub-section of Chemical Pathology, apart from the Section of General Pathology, at the Seventeenth International Congress of Medicine to be held in London next August. I would like to see such a sub-section in the Royal Society of Medicine.

Much has been done by bacteriology to explain puerperal septicæmia, as well as various local and general infections such as gonorrhœa, bacilluria, syphilis, pyelitis of pregnancy, &c., but physiological chemistry is now needed to help.

In general medicine microbes do not explain gout, diabetes, Graves's disease, Hodgkin's disease, or even rheumatoid arthritis. Physiology has unravelled some of the mysteries of myxœdema, acromegaly, and Addison's disease, but none of these diseases can be fully explained without further light from physiological chemistry. In our own special subjects microbes do not explain eclampsia and the other toxæmias of pregnancy and the puerperium.

Our ignorance of the causation of puerperal albuminuria and eclampsia, acute yellow atrophy of the liver, hyperemesis gravidarum, chorea of pregnancy, and puerperal insanity, is still profound.

It is now well established that, in addition to the physiological functions of the placenta, the ovaries, and the mammary glands, these organs have important internal secretions which may be either neutral, toxic, or antitoxic under different circumstances.

The Placenta.

Much excellent work has been done of late on the chemical physiology of the placenta. It is proved that ferments are produced by the trophoblastic layers of the chorionic epithelium of the placenta, and that these exert a destructive action upon the surrounding maternal tissues. By this action toxins are apparently normally produced, and autotoxæmia may result under circumstances at present unknown to us.

These enzymes or ferments can be demonstrated, according to Abderhalden, in the blood of pregnant women from the sixth week of gestation to a fortnight after delivery, and their presence provides us with a method of serum diagnosis of pregnancy which Dr. Herbert Williamson considers absolutely reliable. With the object, apparently, of neutralizing these toxins and of preventing autotoxæmia by rendering the woman immune, antibodies are formed, and are found in the maternal blood between the sixth and fourteenth weeks of pregnancy, the period of the maximum destructive activity of the chorionic epithelium.

Mosbacher[1] has also shown that syncytial cell albumen of the early human placenta contains a toxin which is able to produce fatal anaphylaxis in guinea-pigs in thirty minutes, but he finds that antibodies which neutralize the syncytial toxin are found in the blood of pregnant women right up to the end of the gestation period.

These toxins have not yet been isolated, nor is their chemical composition known with any more certainty than in our student days, so that we do not even know if Abderhalden and Mosbacher are speaking of the same toxins.

Acidosis in Pregnancy Toxæmia.

The importance of the phenomena of acidosis in pregnancy toxæmia on which Dr. Walter Swayne read a paper to our Section last Session, has led to much attention being paid to that aspect of the question. In an article published in the *Lancet* on May 17, 1913, Dr. Herbert Williamson further discusses the problem of the diagnosis of the albuminuria of pregnancy, and considers that we are justified in concluding that a condition of acidosis is found constantly in severe cases of pregnancy toxæmia and not in cases of severe chronic nephritis unless toxæmia has been superadded. If this be so it is a great gain to our previous knowledge on the subject, and clears the line for further discoveries and for more intelligent methods of treatment.

That members of our Section have been able, with the assistance of their colleagues skilled in chemical pathology, to arrive at such valuable conclusions, cannot but make our Section proud of the work being done by its members.

Internal Secretion of the Ovaries and of the other Ductless Glands in their relations to Obstetrics.

The physiology of ovarian secretion was discussed during last session by Dr. Louise McIlroy in a most valuable contribution ; and during this session Dr. Blair Bell in the Arris and Gale Lectures at the Royal

---

[1] *Deutsch. med. Wochenschr.*, 1911, xxxvii, p. 1021.

College of Surgeons, has added some further facts and suggestions to our knowledge of the genital functions of the ovaries and of the other ductless glands. He dwelt especially upon the effect of removal or disease of the thyroid, the pineal, the pituitary, the thymus, and the suprarenal glands upon the functions of the ovaries and the uterus. He further dwelt upon the organic harmony in health of the ductless glands in regard to the genital functions, and upon their altered interrelations in disease. A valuable review by Dr. Louise McIlroy in the May number of the *Journal of Obstetrics and Gynæcology of the British Empire* has brought our knowledge of "ovarian secretion" up to date.

The Council of our Section have arranged for a discussion to be held at the November meeting, when a paper will be read by Dr. Blair Bell on "The Secretions of the Ductless Glands and their Relations to Obstetric and Gynaecological Disorders and Procedures," and Dr. Louise McIlroy has been invited to open the subsequent discussion.

As regards the action of the internal secretions of the other ductless glands, it is now established that there is not only an organic and functional harmony between them but a compensatory interaction between all the glands as well. Each gland acts in a particular manner upon the blood-stream passing through its tissues, altering its chemical constitution by a chemical process, and often adding to it important organic bodies of vital importance to the well-being of the individual. If any organic disease or abnormality exist in a particular gland, the missing or altered function seems often to be taken on by other ductless glands, so that the individual is saved from disaster. In other cases the altered metabolism of one gland upsets the normal metabolism of other ductless glands and the individual is seriously affected.

The significance of the whole subject of internal secretion is enormous, and its full recognition is still in its infancy. It is probable, as Dr. Blair Bell says, "that every cell in the body is a ductless gland and has some influence on the life and functions of the rest." If so, it is easily seen how groups of functionally similar cells can, by forming organic products, act as chemical messengers, or "hormones," as Dr. Starling has called them, and influence the whole body organization. Dr. Blair Bell also shows that these "hormones" exert a special influence upon "the reproduction of the species, in all its intricate necessities." When the ovaries and the other reproductive organs atrophy and become functionally inactive, he considers that "the genital functions of the rest of the ductless glands cease, and the rearrangement of the metabolism that follows produces what are known as the symptoms of the menopause." He suggests that a knowledge of the special function of each of the ductless glands, and a close study of the particular menopause phenomena in each case may enable us to treat the symptoms with more success than at present. To treat all the ills of the menopause with ovarian or lutein extract when the symptoms point to the effects of altered metabolism of another ductless gland is not logical.

Lactation.

The physiology of lactation is getting much light thrown upon it by physiological chemistry. It has long been known that lactation is not determined by nerve excitation. A case of my own where normal parturition and lactation followed complete paraplegia below the fifth dorsal vertebra from an accident six months previously, confirmed this. Recently Professor Schäfer[1] showed experimentally that mammary secretion is induced as the result of galactogogue hormones circulating in the blood derived from the posterior lobe of the pituitary body, from the corpus luteum and from the involuting uterus, and from the lactating mammary gland itself, whilst hormones derived from the placenta and the fœtus during pregnancy have an inhibitory effect.

(II) *The Endowment of Motherhood.*

The nation—all civilized nations—in these days of a lessening birthrate are waking up to the realization that a pregnant woman and her unborn babe is a national asset, worthy of every care and consideration. We hear much nowadays of the "endowment of motherhood." To our Section has been transmitted the traditions of both its amalgamating predecessors. The Obstetrical Society of London, by its successful efforts, spread over fifty years, to improve the condition of lying-in women and to lessen infantile mortality, has done much to endow motherhood in its truest and most comprehensive sense. The "endowment of motherhood" is not only to be obtained by providing financial assistance to the mother, as is done, for instance, by the maternity benefits of the National Insurance Act after labour. The chief aim of those seeking to endow motherhood should be to give every mother an assurance of security and well-being during the whole time of pregnancy, labour, and the puerperium, each of which is to her a period of anxiety and stress.

---

[1] Address delivered before the Liverpool Medical Institution, March 6, 1913.

Apart also from all sentiment or sympathy with the individual, "the unmarried mother and the unwanted child," as Harold Begbie phrases it, demand both our professional consideration and the protection of the State.

During the Pregnancy.

This security should be ensured during the pregnancy by skilled professional advice followed by wise, tactful supervision. For the professional advice to be really effectual, a sufficient and in many cases a pelvic examination of every pregnant woman should be made during the middle months of gestation, especially if she be a primi-gravida. Her urine also should be scientifically examined, especially as regards albumin and acidosis, and if she has previously had abortions or still-births, the quantity of urea should also be estimated. If evidence be forthcoming that toxæmia is present, or that labour may be abnormal or difficult, the practitioner should be able to arrange for the woman to continue under expert supervision. This is difficult, even in private practice, but almost impossible under our existing conditions as regards the poorer classes. Dr. J. W. Ballantyne's[1] suggestion of a prematernity or pregnancy ward or pavilion seems the best way of meeting the case. The necessary treatment could then be carried out. If surgical treatment were required it could either anticipate or accompany the onset of labour as occasion demanded, instead of being adopted, as it often is now, as an emergency operation, after repeated pelvic examinations or instrumental attempts at delivery before admission. We know that "pregnancy wards" reduce the risk of obstetric operations enormously; Cæsarean section, for instance, has its maternal mortality reduced from 34·3 per cent. in cases previously examined, &c., to 2·2 per cent. in clean cases such as those who have been inmates of a prematernity ward.[2] Paul Bar[3] shows that in placenta prævia cases, out of 108 patients treated as "emergency cases" he had 10 deaths from infection, whereas no deaths occurred from this cause in forty-eight cases in the prematernity wards.

---

[1] *Brit. Med. Journ.*, 1901, ii, p. 813.

[2] Routh, Amand, *Journ. of Obstet. and Gyn. of Brit. Emp.*, xix, 1911, p. 48.

[3] *Arch. mens. d'Obstet. et de Gynéc.*, Paris, 1912, i, pp. 162, 176.

Routine examination during the middle months of pregnancy is now adopted at many of our lying-in institutions when women enter their names for admission, though, unfortunately, statistical evidence of its value is not available. To ensure full security however to such women, suitable prematernity wards must be provided throughout the country.

From the point of view of the unborn child, routine examination of the mother during pregnancy and adoption of appropriate maternal treatment is essential if we are to have any success in dealing with intra-uterine mortality. Eugenics should begin before birth, not afterwards. A child has the right to be born healthy.

Careful inquiry should be made as to the causes of previous abortions or stillbirths, or of the deaths of previous children soon after birth, for I am convinced that congenital syphilis, entirely unsuspected, is not infrequently the cause of both fœtal and early infantile mortality. As small doses of mercury given to the woman during pregnancy will in such cases often give her a healthy child, every effort should be made tactfully to discover whether such treatment is indicated. It must be remembered that apart from a history of stillbirths, &c., a woman may show no indication of specific infection. Sometimes information can be obtained by inspecting the other children of the mother.

There is no doubt that apart from congenital syphilis, which varies in importance in different nationalities and even in different localities (urban and rural), the three main causes of stillbirth are auto-toxæmia, pelvic contraction, and malpresentations.

It has been computed that if women were properly examined in pregnancy, half the stillborn children would be saved. If so, this would mean an annual saving of nearly 10,000 fœtal lives in England and Wales, for, omitting abortions, there were 2,312 stillbirths notified in London alone during 1910, or 2·2 per cent. of the total births. If this proportion holds good for England and Wales the number of stillbirths in that year would be 19,736, and we could hope to save 9,800 lives by routine prophylactic measures.

Chambrelent[1] has a large clinique for pregnant women in Bordeaux and he there examined 612 pregnant women during 1910. He found that 135 women—i.e., 21 per cent.—presented complications or abnormalities requiring special care, and as a result of such care the birth

[1] *Journ. de Méd. de Bordeaux*, 1913, xliii, p. 271

mortality was reduced to 2·85 per cent., or a saving of two-thirds as compared with the official figure.

The registration of births should in my opinion be compulsory, not only after "viability" as regards births and stillbirths, but should be enforced at every period of pregnancy. If this were done, and the practitioner or midwife were also requested to state the apparent cause of the death or of the expulsion of the ovum, we should, as a first result, begin to realize how little we know of the causes of intra-uterine mortality, and as a second result we would obtain some statistical evidence of the huge waste of life continuously going on, and in time would arrive at some precise knowledge as regards ætiology and prophylaxis.

Much good might at once be done by a careful examination both of the fœtus, placenta, and membranes, in all the abortions and stillbirths in our hospitals. This would accustom the student to that particular type of investigation and might encourage a continuance of it when in private practice later on.

This plan of routine examination was adopted in 180 consecutive cases of stillbirth by Dr. Herbert Spencer between 1887 and 1900, and his paper of nearly 100 pages (*Obstetrical Transactions*, xxxiii, 1891, p. 203) is one of the most valuable and suggestive in our annals, showing amongst other things how hæmorrhages into the brain and other organs was a frequent cause of death during labour.

During Labour.

Skilled assistance during labour by registered midwife or medical practitioner is now within the reach of every woman, either in her own home or in a lying-in ward or hospital. There is no doubt that the prospect of obtaining the 30s. Maternity Benefit under the National Insurance Act enables poor women to approach the time of labour with a greater sense of security than heretofore; and if some arrangement or pre-arrangement could be arrived at by which the benefit would be paid as soon as the birth is notified, its advantages would be very much greater. Expert or hospital treatment can usually also now be provided within a reasonable distance if special surgical interference be required.

During the puerperium, however, there is often little or no skilled supervision after the first ten days, and the early cessation of supervision tends to encourage the mother to return to work and to married life at much too early a date. The early return to work is the cause of much maternal illness, which is often pelvic, and leads to either a disinclination for, or even to a dread of, future pregnancies, or to real physiological inability to conceive again, or to intra-uterine fœtal death if pregnancy should again supervene. The child too often suffers, even more than the mother, from the latter's early return to work. Errors of diet, neglected ophthalmia, or uncleanliness, may each cause permanent ill-health.

Much is being done in large cities where factory operatives are numerous to encourage rest during the earlier period of uterine involution, and the medical and sickness benefits of the National Insurance Act further encourage this, but much more requires to be done.

Schemes to provide home nursing for insured persons by arrangement between local Nursing Associations and Approved Societies are now being organized and bid fair to be very successful. Approved Societies and Insurance Committees have the power under the Act "to grant subscriptions for the support of district nurses." Queen Victoria's Jubilee Institute for Nursing the Sick Poor, and Town and County District Nursing Associations throughout the country, acting in harmony with these approved societies and with the Central Midwives Board, are doing much, and can do much more, to lessen the risk of maternal illness and infantile mortality during the few weeks following labour.

Infantile mortality under 1 year of age in England and Wales was 163 per 1,000 in 1899, and is now under 105. This represents a saving of life of over 52,000 infants per annum. Very much, however, remains to be done, for in 1909 there were 99,430 deaths of infants in England and Wales under 1 year of age, and nearly 40,000 of these died in the first month of life. Out of 1,000 births 11·5 children die in the first twenty-four hours of life, 24·6 infants in the first week, 30·3 in the first fortnight, and 39·75 during the first month. Roughly speaking, out of every ten children who die in the course of their first year of life, four die in their first month.

If the nation could come to look upon maternity as a blessing, and worthy of every encouragement and support, and could secure to the new-born child a month's healthy start in life, many of these babes who now die from the ignorance of their mothers, from unhealthy environment, or improper or insufficient food, would survive. It must be remembered, too, that a healthy child who has survived the first month of life has every chance of growing up strong, for it is the weakling who dies, not the robust child of a happy, healthy mother. Infantile mortality is being greatly diminished in localized areas by organized home visiting and nursing, and by special effort to encourage lactation instead of artificial feeding, and if the nation, as a result of its appreciation of motherhood and of the greater relative value of the life of the newborn, can make these local efforts a national one, and at the same time avoid the moral disaster of pauperization, the race cannot fail to be improved, and the wealth and stability of our country thereby must be proportionately increased. Our Section will not fail to encourage progress in the scientific aspects of such an obstetric ideal.

R
35
R7
v. 6
pt. 2

Biological
& Medical
Serials

Royal Society of Medicine
London
Proceedings

PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET

UNIVERSITY OF TORONTO LIBRARY